DOCUMENT RESUME

ED 343 798 SE 052 651

TITLE Girls and Women in Science: Science and Technology Roadshow. Report and Manual.
INSTITUTION Commonwealth Secretariat, London (England).; Ministry of Education, Gaborone (Botswana).
REPORT NO ISBN-99912-1-032-6
PUB DATE Jan 91
NOTE 77p.; Report from the Science and Technology Roadshow (Botswana, August 12-18, 1990).
PUB TYPE Reports - Descriptive (141)

EDRS PRICE MF01/PC04 Plus Postage.
DESCRIPTORS *Career Awareness; Evaluation; *Females; Foreign Countries; Program Descriptions; Publicity; *Science Activities; Science Education; Secondary Education; *Student Attitudes
IDENTIFIERS Botswana

ABSTRACT

This document details the development of a Science and Technology Roadshow for girls, that moves from city to city, region to region, carrying the message to girls about opportunities for them in scientific and technical careers. The objectives of the roadshow were twofold: (1) to show women and girls that they could succeed in many more areas of employment if they sought the appropriate qualifications and training in science and technology; and (2) to make an impact on the attitudes and myths that prevent girls and women from taking advantage of today's opportunities in science and technology. This document contains both a report of the roadshow and a manual on how to conduct a roadshow. The report section contains the objectives, participants, roadshow organization, a description of the program, and a discussion on publicity. The manual section includes: (1) starting preparations; (2) preparation of resource material; (3) selecting and inviting the participants; (4) preparing for and running technical activities; (5) exposure to computers; (6) organizing competitions; (7) organizing a career guidance clinic; (8) arranging study visits; (9) opportunities for discussion; (10) publicity; (11) documentation; and (12) evaluation. Appended are a copy of the program of activities and a list of the student participants and their addresses. (KR)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

ED343798

GIRLS AND WOMEN IN SCIENCE: SCIENCE AND TECHNOLOGY ROADSHOW

Report and Manual

U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improvement
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

X This document has been reproduced as received from the person or organization originating it.

☐ Minor changes have been made to improve reproduction quality.

• Points of view or opinions stated in this document do not necessarily represent official OERI position or policy.

"PERMISSION TO REPRODUCE THIS MATERIAL HAS BEEN GRANTED BY

C. E. Coombe

TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

Commonwealth Secretariat
Education Programme

Government of Botswana
Ministry of Education

SE052651

BEST COPY AVAILABLE

GIRLS AND WOMEN IN SCIENCE: SCIENCE AND TECHNOLOGY ROADSHOW

Report and Manual

Commonwealth Secretariat
Education Programme

Government of Botswana
Ministry of Education

January 1991

ISBN 99912–1–032–6

GOVERNMENT OF BOTSWANA
MINISTRY OF EDUCATION
PRIVATE BAG 005
GABORONE
BOTSWANA

COMMONWEALTH SECRETARIAT
EDUCATION PROGRAMME
HUMAN RESOURCE DEVELOPMENT GROUP
MARLBOROUGH HOUSE
PALL MALL
LONDON SW1Y 5HX
UNITED KINGDOM

FIRST PUBLISHED 1991
COPYRIGHT COMMONWEALTH SECRETARAT/ GOVERNMENT OF BOTSWANA

Copies of this report, and further information can be obtained from the Ministry of Education, Botswana or the Commonwealth Secretariat Education Programme, London.

PRINTED BY THE GOVERNMENT PRINTER, GABORONE, BOTSWANA, 1991

Contents

Preface **p.1**

Report **p.3**

1. Introduction
2. Objectives
3. Participants
4. Roadshow organisation
5. The programme
   - 5.1 Use of role models
   - 5.2 Career guidance
   - 5.3 The role of practical activities
   - 5.4 Competitions
6. Publicity
   - 6.1 Reaching the public
   - 6.2 The roadshow magazine
7. What's next?
8. Conclusion

Manual **p.23**

1. Introduction
2. Starting preparations
3. Preparation of resource material
4. Selecting and inviting the participants
5. Preparing for and running technical activities
6. Exposure to computers
7. Organising competitions
8. Organising a career guidance clinic
9. Arranging study visits
10. Opportunities for discussion
11. Publicity
12. Documentation
13. Evaluation

Acknowledgements **p.59**

Appendices **p.65**

1. Programme
2. Participants

GIRLS AND WOMEN IN SCIENCE: SCIENCE AND TECHNOLOGY ROADSHOW

REPORT & MANUAL

This publication results from the Science and Technology Roadshow held in Botswana, 12-18 August 1990, organised jointly by the Ministry of Education, Botswana, and the Commonwealth Secretariat Education Programme, with support from UNESCO and the Swedish International Development Authority (SIDA).

The report and manual have been compiled and edited by the organising team in Botswana, and printed by the Government Printer, Gaborone.

Photographs are by Michael Kahn.

Preface

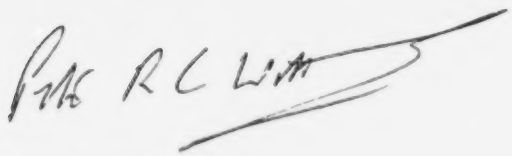
Science and technology hold some of the keys to development and to unlocking Africa's resources so as to improve living standards on the continent. It is vitally important that girls and women share the same access to opportunities in science as their brothers and husbands, and that they themselves embark on scientific and technological careers, since they represent half of a nation's talent and - recognising the special role they play in relation to their children's upbringing and values - even more of its potential.

At their Tenth Conference in Nairobi, Commonwealth Education Ministers expressed concern at the continuing under-representation of girls in diversified vocational and technical education programmes, in spite of non-discriminatory policies of entry for them. They urged that countries that had not already done so should commit themselves to a policy of affirmative action by enhancing existing programmes for women and girls so as to encourage their fuller participation in a wide range of vocationally-oriented courses, and requested the Commonwealth Secretariat to continue also to encourage equal opportunities for access to science and technology education.

The Commonwealth Secretariat has focused on women and development issues as a priority concern in its consultative and functional activities: through national and regional workshops, commissioned studies on gender stereotyping, publications like **Women Too in Science and Technology** (1990), networking, and cooperation with non-governmental organisations throughout the Commonwealth.

It is in this context that the Commonwealth Secretariat initiated the concept of a **Science and Technology Roadshow** for girls, which would move from city to city, region to region, carrying the message to girls about opportunities for them in scientific and technical careers. The concept of a series of exhibitions, practical activities, publications and cooperation with female role models had already been tried out in Ghana, during a workshop for top science students in Ghana's secondary schools. But a fully-fledged model of Roadshow activities remained to be devised when the Commonwealth Secretariat Education Programme invited African Ministries of Education to act as hosts for such a Roadshow.

We were delighted when the Ministry of Education for Botswana agreed to pioneer this event, which they did with much care and enthusiasm. We are particularly grateful to the Hon R M Molomo, Minister of Education for Botswana, and his professional colleagues for their willingness not only to devise the Science and Technology Roadshow for Botswana, but to share their experience with others in the Commonwealth. We also wish to thank UNESCO and SIDA for their support, as well as the other agencies - inside and outside Botswana - who have joined in this endeavour. The Roadshow and this manual are splendid examples of international cooperation.



Peter R C Williams
Director
Education Programme
Human Resource Development Group
Commonwealth Secretariat

London
December 1990

REPORT

1. INTRODUCTION

In May 1989 the Commonwealth Secretariat Education Programme invited African countries to act as hosts for a Science and Technology Roadshow for girls. In Botswana, the Ministry of Education and the professional organisations involved in science and technology education, had for several years been running activities to interest and attract youth into science and technology. An international activity of the proposed kind, we thought, would boost our own efforts. The Ministry of Education of Botswana therefore accepted the Commonwealth Secretariat's invitation and the first **Commonwealth Secretariat Science and Technology Roadshow** was held in Botswana from 12 to 18 August 1990.

The main target group was to be secondary school students with an aptitude in science, mathematics, agriculture and 'design and technology'. Activities and materials were to be produced to encourage these young people to take up careers in science and technology and to stress that these career options are also available and suitable for girls and women. Other target groups were parents, teachers, employers and the public in general, who were to be provided with information on the country's need for scientific and technical manpower and to be encouraged to change their attitudes towards women in these fields.

The concept of a 'Roadshow' evolved from the idea that materials and suggestions for activities produced in one place could be passed on to another. In Botswana we settled for two cities, Gaborone and Francistown. Students from schools in the south of the country attended the Gaborone Roadshow from 12 to 15 August; students in the north attended the Francistown Roadshow from 15 to 18 August. Hopefully other cities, other countries will take it up from here.

The Botswana Government's concern on the issue of attracting young people into science and technology was raised by the Hon R M Molomo, Minister of Education, during his opening speech to the Roadshow in Gaborone:

> *It is now the priority objective of my Ministry that everything possible must be done to promote vocational and technical education and training in response to the identified priority demands of our industrial development. I am currently exploring all possible options that may offer promising prospects for the creation of opportunities for qualified Batswana, who may be persuaded and encouraged to go for vocational and technical training.*

The Hon R M Molomo, Minister of Education, Botswana

The specific emphasis on the gender bias had not, up to this point, been a central issue in Botswana, mainly because educational opportunities have always been open to both sexes. In some exceptional cases where there may have been some gender discrimination, these have now been removed. At the same time, statistics show that very few girls indeed enroll for courses leading to scientific and technical careers. Providing access to educational institutions is obviously not sufficient. There is also the problem of attitudes: the way the parents bring up their children, the advice and encouragement (or lack of it) provided by teachers, the policies of the employers, and so on.

For countries like Botswana, and probably most other African countries which have an acute shortage of local (wo)manpower in the fields of science and technology, the answer might lie in involving the girls and women.

This was expressed by the Hon Dr G K T Chiepe, Minister of External Affairs, at the Roadshow closing ceremony in Francistown:

> *Botswana, as you all know, needs a lot of scientists and people with technical skills. I think everybody who is here will agree that there are very few women who have trained for engineering and other related technical careers. Most women opt for administrative, teaching and secretarial courses which is quite unfortunate because there are lots of intelligent, capable women in this country who can do much better than men in science related courses.*
>
> *If we could have as many girls enrolled in science and technology based courses as there are boys, then we would be optimistic that our long-term objective of localization in engineering and the industrial sectors would be realized in the near future.*

The Hon Dr G K T Chiepe, Minister of External Affairs, Botswana

The Roadshow theme of getting more girls and women into science and technology was obviously also an issue for Botswana.

2. OBJECTIVES

The objectives of the Roadshow were

(i) to show women and girls that they could succeed in many more areas of employment if they sought the appropriate qualifications and training in science and technology, and

(ii) to make an impact on the attitudes and myths which prevent girls and women from taking advantage of today's opportunities in science and technology.

Although some activities with the same objectives have already taken place in various countries, the idea of a Roadshow for Africa was a new one and the following objectives were added:

(iii) to demonstrate to Commonwealth countries in Africa a key strategy for enhancing the participation of women in the development of science and technology

(iv) to develop a suitable model for running women's training roadshows/fairs in science and technology in Africa

(v) to devise a manual and other materials which could help others wishing to mount a Roadshow of this kind.

3. PARTICIPANTS

At first it was decided to invite girls only. However, considering the second objective, we decided it would be appropriate to invite boys as well. Hence we settled for a ratio of two to one. Each senior secondary school was asked to nominate two girls and one boy who had shown exceptional aptitude in mathematics, science, agriculture and/or 'design and technology'. In addition we invited the winners, both boys and girls, from our national project competitions/fairs in the same four subjects. This totalled about one hundred students split between two venues: Gaborone for southern Botswana, and Francistown for northern Botswana.

We also invited four teachers from each of the six regions in Botswana (approximately twelve teachers for each of the two venues). The reason for inviting teachers was primarily so that they could pick up ideas which at a later stage could be used or adapted for similar activities at school or village level. The teachers were identified by the Education Officers based in the regions.

With the support we received from UNESCO, we were also able to invite one teacher and two female students from each of the neighbouring SADCC (Southern African Development Coordination Conference) countries. We had participation from Swaziland, Lesotho, Zambia, Zimbabwe and Namibia. Malawi was unable to attend. The names of all participants are given in Appendix 2 on page 69.

Participants and resource people at the opening ceremony

The Commonwealth Secretariat was represented by Mr J R Swartland, Assistant Director for the Education programme (left)

UNESCO was represented by Mr E Apea, Chief for the Science and Technology Education Section in the Division for the Development of Education (right)

In addition to our own resource people and role models, the funding made available through the Commonwealth Secretariat enabled us to invite resource people and role models from Nigeria, Ghana, Kenya, Uganda and Zambia. The names of external role models and resource people are given in the Acknowledgement section (see page 59).

All foreign participants and resource people attended both the Gaborone and the Francistown Roadshows.

4. ROADSHOW ORGANISATION

The Ministry of Education took on the coordinating role. However, the fact that few students opt for and qualify for careers in science and technology is a national problem that should concern all departments and organisations training and using scientists and technologists. Hence a large number of ministries, training institutions, private companies, embassies and professional organisations were invited to contribute professionally and financially to this event. The wide range of contributors, in total about forty, included hospitals, a mining company, computer companies, the national airline, the agricultural research station, architectural and engineering firms, laboratories, vehicle repair workshops, the University, the Polytechnic and the Brigades.

Several smaller committees with wide representation were set up to prepare for different aspects of the Roadshow, including programme activities, career guidance, publicity, documentation, and practical arrangements, such as moving the Roadshow from Gaborone to Francistown. At intervals all committees came together for coordinating meetings. In Francistown, which is situated 440 km north of Gaborone, a separate committee was set up to handle specific aspects of the Francistown Roadshow. The coordinator moved between Gaborone and Francistown. Altogether about fifty people were involved in the planning and organisation of this event.

To minimise preparations we tried as far as possible to make the Francistown Roadshow a repeat of the Gaborone Roadshow. For each activity planned in Gaborone we planned something similar in Francistown - but not identical. The foreign students were going to attend both venues and we didn't want them to repeat an identical activity. By necessity some of the activities in Francistown worked out differently as the facilities available there were different. All printed resource material and all publicity material prepared in Gaborone were of course also available to Francistown. The Francistown committee identified its own role models and a few other resource people. Mining engineers and training officers were brought in for the Career Guidance Clinic from a diamond mine 240 km away from Francistown. However, a number of resource people also had to be brought from Gaborone, e.g. Polytechnic and University lecturers, computer specialists, etc.

One of the major administrative problems was the transfer to Francistown. Each Roadshow was scheduled for two days, but to ensure the students had two full days we made them arrive the evening before and leave the morning after. Thus the Gaborone participants arrived Sunday afternoon and departed Wednesday morning; Francistown participants arrived

Wednesday afternoon and departed Saturday morning. On that Wednesday all foreign resource people, foreign teachers and students, a number of organisers and local resource people, a reporter, photographic exhibitions, computers, and other resource material had to be transferred the 440 km from Gaborone to Francistown - a convoy of 7 vehicles! Our transport requirements for the Roadshow were quite extensive and a member of the organising committee was working full-time as transport coordinator throughout the two Roadshows.

In addition to the people serving on the committees, approximately forty role models and an additional forty resource people, some of them foreign, assisted with the running of the Roadshows. It is thanks to this large and high-level professional input, as well as the generous financial input from both internal and external organisations, that it was possible to produce a Roadshow of the type described in this document.

The full list of contributors, committee members, local and external role models and resource people is given in the Acknowledgement section (see page 59-64).

5. THE PROGRAMME

The objective for the Roadshow was to allow girls to 'discover' themselves as scientists, to take away any fears they might have of science and technology, and to show them the way leading to such careers. Hence we identified *practical activities* and *career guidance* as the two most essential components of the Roadshow programme.

In brief the programme was designed so that students were involved in practical scientific and technical activities during the morning sessions. The afternoons were reserved for career guidance activities. For the evenings we arranged such things as discussions, competitions and games.

Programme Outline	
Morning session 1	Practical Activity
Morning session 2	Practical Activity
Afternoon session	Career Guidance Activity (*)
Evening session	Competitions, Games, Discussions (*)

* some of these events were open to the public

The detailed programme is shown in Appendix 1, p. 65. In the programme leaflet given to participants, we referred to the different practical activities as activity 1, activity 2, etc. We wanted each activity to be a surprise, and in some cases it was essential that no-one knew what was to happen - for instance the bicycle assembly competition. In Appendix 1 the names of the activities have been listed in a separate column for the benefit of the reader.

5.1 Use of Role models

One of the earlier activities from which the organisers had gained experience was the annual girls' clinic in Ghana, where secondary school girls are invited for one or two weeks to meet women scientists/technologists, listen to their experiences and visit their work places. Another learning experience for us was a recent publication by the Commonwealth Secretariat called **Women Too in Science and Technology in Africa** which contains interviews with women scientists/technologists. In both cases, the key strategy was to use **role models: women who have opted for and succeeded in scientific or technical careers.**

We decided to follow the same approach. By using these role models, we hoped to dispel the myths that all of us are too familiar with: that *'women are not mechanically or technically inclined or capable of thinking and working scientifically'*, that *'women are not interested in science and technology'*, that *'women cannot be successful scientists or technologists'*. (From Apea's key-note address, Francistown)

We decided to use role models in the Roadshow in a variety of ways:

(i) in the resource documentation, i.e. on the poster, in the pamphlet, for the resource booklet, for the photographic display, for the role model video.
(ii) for the career guidance activities described below.
(iii) as speakers and panelists.

Role model presenting a key-note address

Having the opportunity to meet role models personally was a powerful experience. Although we do meet certain scientists such as doctors from time to time, the opportunity is not there to ask questions about the job. The career guidance clinic did provide this opportunity. Students were able to ask the doctor and other scientists questions like

Why did you choose to become a doctor?
Are you not afraid when you have to do operations?
How often do you have night duty?
What is the difference between a civil engineer and a mechanical engineer?
What subject do I need to take at school if I want to become a geologist?

All our role models demonstrated great motivation and enthusiasm for their respective careers. They told the students why their work is so stimulating, but also mentioned some difficult aspects of the job such as being called out at night, or frequent travelling (which could be both rewarding and inconveniencing), how they cope with family life, etc.

5.2 Career Guidance

The Career Guidance Clinic, which was open to the public, was meant to be an opportunity for the students and the public to get answers to any questions related to training, sponsorship, job opportunities, the work situation, etc, in a wide range of scientific and technical careers, covering all levels of training and education. Some of this information was collected in advance and put into the resource booklet, which was available as a reference document during the clinic.

The different careers were grouped in areas, and a room and a coordinator was assigned to each career area. For instance, there was a room for medical careers, a room for careers in agriculture, a room for mechanical and electrical engineering, a room for mining and geology, etc. Each room was staffed with role models and lecturers from the relevant training institutions, who had brought with them career information (charts, pamphlets etc.) and tools for giving out this career information (overhead projector transparencies, computers, videos etc.). The approach used in the different rooms varied slightly depending on its coordinator.

How do I go about getting a scholarship?

BEST COPY AVAILABLE

There was also a room where students could get more general information and guidance about careers, information on scholarships, and so on.

Other activities during the career guidance clinic included a video film show. Three short role model videos were produced for the Roadshow showing women scientists/technologists in their normal work situation.

We found that the use of a role model video was an effective way of giving a picture of what working life is like for a woman scientist. In the video students were able to see the pilot flying a jet and the wildlife biologists counting a herd of animals in the swamps - something they could not experience in a career guidance clinic or an afternoon study visit.

Study visits to role models at work were arranged. There was only time for one visit for each student. To make the best of that one visit, we allowed the student to choose from a list of ten places. A group of about six students went to each work place. For each work place we had a coordinator to ensure that at each place the students should not only look and listen, but if possible also do something - to get a feel of the job. Hence students had the opportunity to feed animals 'scientifically' at a research station, make soil tests and analyse the results on a computer, try out an architect's drawing board, and so on.

A visit to a physiotherapist

5.3 The Role of Practical Activities

To break the psychological barriers that students, especially girls, often have against science, mathematics and 'design and technology', practical activities were arranged to show them that there is nothing very difficult or impossible about science and technology and that, in fact, it can be quite fun. These included using workshop tools, exposure to computers, equipment assembly, scientific/technical games and puzzles. Each practical session lasted about two hours and obviously there wasn't enough time for the students to develop great skill. However, the aim of the activities was not to develop skills as such, but rather to stimulate the

students and take away any fear they might have for such equipment or activities.

The exposure to computers turned out to be a very popular activity. For many of the students it was their first exposure. A simple programme where students entered responses was used and a hand-out provided some leading questions to make them think about what the computer did to their responses.

For many of the students this was their first exposure to computers

Very few girls in Botswana opt for the subject 'design & technology' even though they now have the opportunity to do so. An even smaller number opt for training at the Polytechnic after completing their O-levels. The activity at the Polytechnic was an opportunity to discover what technical education is all about and what goes on at a Polytechnic. The activity involved designing something and then constructing or making this item using a number of tools. The item was one of the following: a maze game, a 'steady hand' game or a pendant for a necklace or key-ring. The nice thing was that at the end of it they had something to take away as proof of their technical ability.

Most activities at the two venues were the same, but not identical. However, one activity was different - the one of assembling something using an instruction. In Gaborone groups of students were asked to assemble a bicycle. In Francistown students, also in groups, were asked to assemble a marimba. A marimba is a traditional musical instrument in this part of the world.

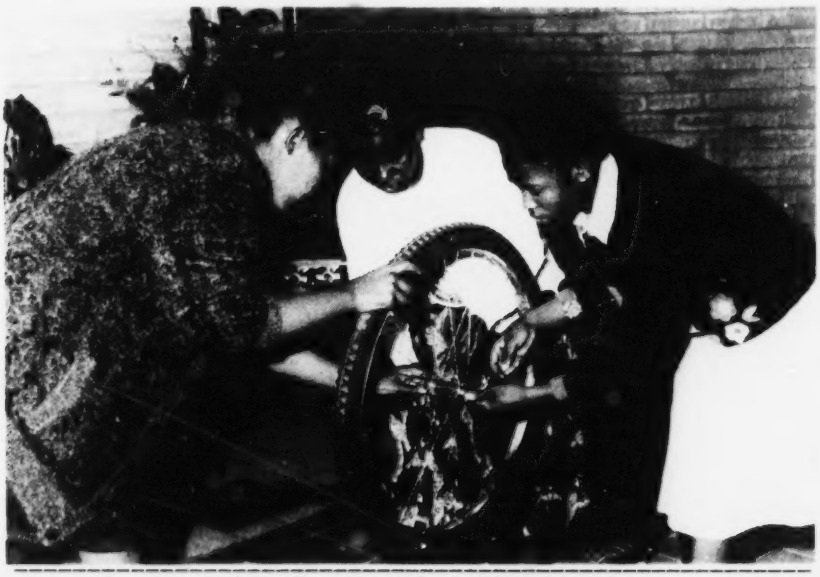
Girl making her own jewellery using workshop tools

The marimba-making required both technical skills and a musical ear

BEST COPY AVAILABLE

The marimba assembly was interesting in that it combined music and technology. Between cutting, drilling and filing, students had to ensure the tuning was correct. Thanks to very careful planning and preparation, the product was of such quality that it could be donated to schools; and the students could be proud of their achievement.

The bicycle assembly was chosen because of its usefulness in daily life. Students were divided into groups of three. Each group of students was given a dismantled bicycle, a bicycle tool kit and written instructions on how to put it together. This activity was run as a competition. They had to assemble the bicycle in the shortest possible time and then ride on it to prove its roadworthiness. Some girls were actually surprised by their own ability; as one girl put it *"we had never really thought of assembling a bicycle before; we just see a bicycle as a mode of transport. Now we have learned a lot... now if the handle bars come loose, I think I would be able to put them back and fasten them."*



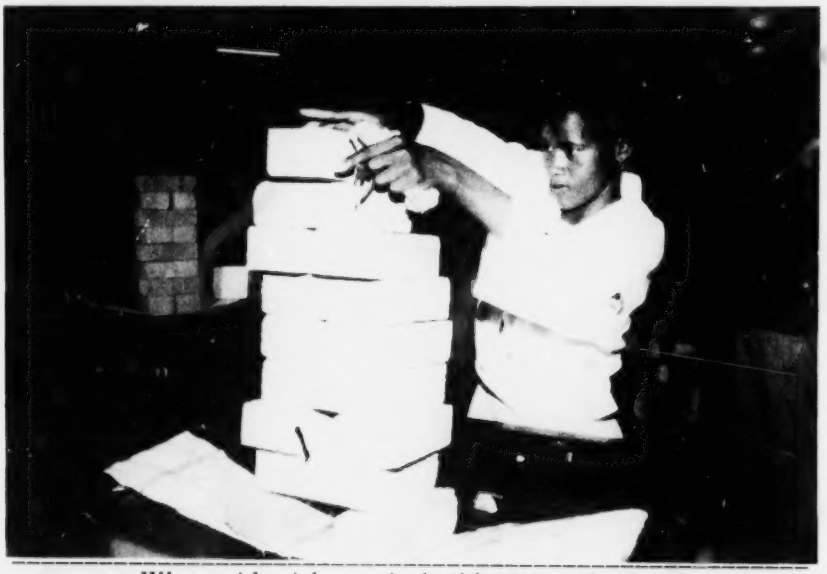
A bicycle race of a different sort!

5.4 Competitions

In all of the above activities, instructions were given to the students to follow. The bridge/tower building was of a different nature. In these activities we asked the students to apply their skills and to use their imagination to design and build a structure. The structure was a bridge in Gaborone and a tower in Francistown. The winning team would be the one whose bridge/tower could hold most house bricks. Some students were not used to this kind of 'open-ended' activity and found it a bit difficult at first, but they soon loosened up and got on with the building. This activity was done on the opening night and served a second purpose as an 'ice-breaking' event. We therefore ensured that that groups were well mixed in terms of sex and nationality.

All competitions were group competitions and there were no tests of any sort for individuals. No competition was based on school knowledge, but rather tested logical thinking and imagination. Some competitions were

quite informal and involved marks for the best-flying paper aeroplane and a high-jump test for a paper frog.



Who said girls can't build strong bridges?

All you have to do is to move the marble from one loop to the other!

6. PUBLICITY

To make an impact on the attitudes and myths which prevent girls and women from taking advantage of today's opportunities in science and technology (the second Roadshow objective), we had to reach out beyond the Roadshow itself.

6.1 Reaching the public

Part of the Roadshow was open to the public. The Career Guidance Clinic was run as an open house activity where students, parents and teachers could get answers to any questions related to training and careers in science and technology. Another attraction during the Career Guidance Clinic was a drama performance. The theme for the sketch was the employer's attitude towards female applicants/employees.

A second activity designed for the public was the panel discussion on the topic **'The Role of Women in Science and Technology'** at the University auditorium in Gaborone and in the Civic Centre in Francistown - venues which we hoped would attract a sizeable audience. Panelists included local and foreign role models, representatives from training institutions and representatives of employers.

Panelists in a discussion on
The Role of Women in Science and Technology

Invitations were made through posters displayed throughout the cities, and through letters to schools. However, relatively few parents and outsiders turned up for the career guidance clinic and the evening panel discussion.

From the point of view of publicity, the newspaper articles and posters were more effective. The local press and radio provided good news coverage of the Roadshow. A large, attractive colour poster showing a female technologist, with the Roadshow slogan **'Women make it in Science and Technology'**, and an information pamphlet on scientific and technical career opportunities in Botswana were circulated country wide to schools, other training institutions, libraries, and work places. Participants also left the Roadshow with bags, folders, T-shirts, car-stickers etc, all bearing the Roadshow slogan.

Further publicity will be given shortly when the role model videos, prepared for the Roadshow, are shown on the local TV network. In addition, all senior secondary schools will be getting copies of these films supplemented by a fact sheet for each profession pictured, for use in careers lessons.

Participants in Roadshow T-shirts

6.2 The Roadshow Magazine

In-house publicity was provided through the Roadshow Magazine.

The Magazine was produced by a team of eight 'journalists', separate teams for Gaborone and Francistown, consisting of Roadshow participants specially selected for this purpose. Many of them were seasoned school magazine committee members in their schools. The journalists not only participated in as many Roadshow activities as possible, but also wrote about them, typed, laid out the Magazine and even collected advertisements from local business.

The teams also gave their magazines names. The Gaborone team decided on **SCIENTECH NEWS**, the Francistown team on **WOMEN MAKE IT**. In Gaborone and in Francistown two magazines were produced, looking like professional newspapers and containing all kinds of reports on the Roadshow activities, in the form of articles, interviews, cartoons, photographs, editorials and the like.

BEST COPY AVAILABLE

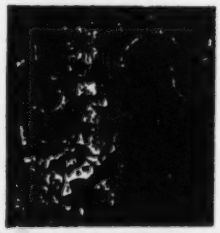
Women Make It.

Newsmagazine for the COMSEC Science and Technology Roadshow.
Volume one, number two. Francistown, 17 August 1990.

Doctors of Tomorrow !

I went with the group of students who want to be the doctors of tomorrow. We went around the Nyangagwe Hospital with Doctor Habwna who showed us many different wards of that hospital.

To me it was very frightening but not for the doctors of tomorrow - as one of the girls even helped a doctor in surgery. When I asked how she felt she said she was not afraid at all. She stressed her point by saying that there is nothing that can prevent her of being a doctor. She was Tiny from Selibe Phikwe. However some doctors of tomorrow changed their minds after seeing all those strange things that doctors encounter!



By: Olga Manyala, Swaneng Hill.

Editorial.

This is already the last issue of the 'Women Make It' Newsmagazine. We hope you enjoyed it as much as we did, and that you don't blame us for the few typing errors we made, like in the heading of yesterdays paper. We are only amateurs!

We hope this Newspaper will have a follow up in one of the other countries in Africa soon. Girls there are also needed in Science and Technology. Our Batswana participants might have got some ideas from our Magazine to put in their local schoolmagazines.

A lot of people should be thanked for making this roadshow a succes. We will mention only a few, the ones who deserve to be mentioned, but are forgotten are too tired anyway to beat us up!

We start with our foreign guests, being 'refereed-ch' and representing their countries. They came from far, and helped to make the show possible!

Mrs. Ngoroma was the pivot around whom this whole roadshow turned. We think she earned the two weeks holidays which are coming up for her (and she mighs deserve it too!). Mr. Swartland, from the COMSEC Secretariat did clearly not restrict his involvement to controlling what we did with the Commonwealth monies which went into the show.

Then we have numerous other people, like Ms. Muelbke, Mrs. Wiffels, the Headmaster of FTTC, the TAPU people, who we disrupted for two and a half days, Mr. Corker, Mrs. Serra, Mr Such and Sr, Ms. Whatwashernameagain and all the others we are now forgetting.....

We also thank ourselves, because we learned a lot and had a good time!

The Editors.

Fig.1 Francistown Roadshow Magazine

SCIENTECH NEWS

Daily Students Newsmagazine for the COMSEC Girls Science and Technology Roadshow. Gaborone, Tuesday 14 August. Vol. 1 No 2

Professor Tlou comments:

Women make rapid Improvements in Science and Technology.

The Professor T.Tlou made a speech. He started off by trying to convince everybody that it is a short speech, so they should not be scared, but remain to listen for a short period of time.

He said he felt honoured having been asked to take part in the Road show although he did not do anything except making a formal speech. He was very glad to see the group of young aspiring scientists and technologists.

Referring to the theme of the Road show, the Vice Chancellor mentioned that once a woman is educated, that means a whole family is educated. Thus he felt that educating a woman in science and technology would be wise since it would help in the development of the country.

The professor was glad to see that there were quite many foreigners at the University because the University is open to anyone and everyone has the freedom of speech as well be done in the Panel Discussion. International organisations are for everybody.

The V.C. mentioned that he had once passed by some construction people making a road , and his eyes were caught by some women laying bricks. He thought they were doing it so that they could clear the way for clearing for the public. Instead, as he stopped to talk to them, he figured out that they were actually employers. Some said they did it as food the family and others did it because they were so poor in having even found all the jobs that nobody said they could not do.

The Professor explains that men were worried that women would effectively take over their jobs. In this respect the V.C. mentioned on young lady women-pilot of Air Botswana.

Prof. T. Tlou closed by expressing his happiness and satisfaction in all the efforts made by women to make rapid strides in the field of science and technology. He wished them well.

By: DABILO MOKORI
Moeding College.

From the Editorial Desk.

Today, Scientech News is two days old. By now almost all of us the Editorial Staff have a more or less vivid idea of the many problems and pressures of a good journalist.

Today, we encountered very few problems. The only one worth mentioning was the last part of the day for one of our technical assistants, Mr. Monk. He had a minor accident when his car knocked into another car in the U.B. campus. This caused all of us to start our day's functions a bit late.

The day's main events were covered effectively by our "by now experienced " reporters. The main event of the day was the visit to the schoolgirls where we had chance to see professional women in their responsive fields of action.

We are very proud that our "Scientech News" now looks more like a professional news-magazine with its many varied contents, the adverts and the columns.

All the same, we accept that "Scientech News" is still a baby aching to grow into an young adult. Therefore, kindly forget and forgive our pitfalls. This child needs your blessing to abandon manners!

Fig.2 Gaborone Roadshow Magazine

The Magazine was distributed on the second and the third day of the Roadshow, and it was in high demand! Every participant was eagerly looking for his/her group activity, an interview, reports from other groups and so on. On the second day the Magazine contained some 'letters to the editor', in which participants aired their views. The Magazine also provided the participants with some kind of 'report' of the Roadshow straight away, which could be taken back to school and home to start spreading the Roadshow message.

7. WHAT'S NEXT?

For those wishing to have further insight into the Roadshow activities a documentary video has been produced. The video film shows students involved in the various activities and also includes interviews with students and resource people. Further information about the video and other documentary resource material can be obtained from the Commonwealth Secretariat Education Programme in London or from the Ministry of Education in Gaborone.

From the comments made by the students in the video film, as well as from the responses to the evaluation questionnaires, we know that the student who had the opportunity to attend this Roadshow are now convinced that *Women TOO can make it in Science and Technology*. However, these participants make up a very small proportion of the student population in secondary schools. Our next task must therefore be to find a way of reaching the others.

The Roadshow is not finished here. We would like the idea to spread to other countries, but we must also arrange follow-up activities within Botswana. A village-level Roadshow can obviously not be as elaborate as a national/international one. However, many of the ideas described here can be replicated at school- or village-level and some things may even work better there. For instance, it should be easier to involve parents in a village. It is their own children's future that is at stake. Some resource people, e.g. role models and lecturers from training institutions, may have to be invited from the cities. For the practical activities, however, all that is required is 'good ideas' and willing people. Meaningful practical activities can be arranged using very simple resource materials. Panel discussions can be arranged using local role models, parents and students. The school drama club can be employed. Essay and poster competitions can be arranged on the Roadshow theme.

8. CONCLUSION

We do believe that we achieved what we set out to do. The outcome was what we expected and had hoped for. This does not mean that the event ran without problems. A full evaluation of the Roadshow is given in the Manual, on page 56.

However, an interesting observation is that we had one outcome we had not expected or planned for. For all those of us involved in the Roadshow organisation, the experience taught us a lot about the problems that lead to the shortage of girls and women in science and technology. As an

afterthought, we think that probably the best publicity (objective number 2) was the involvement of a large number of individuals and organisations in the planning, organisation and running of the Roadshow. We believe that all those involved will from now on be more conscious of what they say or do in the context of training, employing, using and dealing with women scientists and technologists.

MANUAL

1. INTRODUCTION

When Botswana was asked to host this Roadshow, we were also asked to provide a 'model' for future Roadshows. This manual is based on our experience, and meets our fifth objective on page 6.

Since it was the first Roadshow of its kind, at least in this part of the world, we had to start from nothing. This meant we were free to experiment, while at the same time we risked running into some unexpected problems. This manual has been written to give ideas for future similar events, and to brief future organisers on possible pitfalls and how to avoid them.

2. STARTING PREPARATIONS

For the organisers of any event, the two most crucial factors are *finance* and *human resources*. When Botswana was asked to host this event a small coordinating team of three was appointed to start preparations approximately ten months before the event. We started with the finance.

2.1 Fundraising

Although this event was primarily sponsored by the Commonwealth Secretariat, we decided to approach UNESCO for additional support. International organisations such as UNESCO are usually willing to fund aspects of international cooperation, e.g. inviting foreign participants or resource people, and the production of resource materials that can be used in several countries.

In this case the Commonwealth Secretariat was responsible for financing outside resource people, and UNESCO agreed to sponsor teachers and students from neighbouring SADCC countries. Both organisations contributed funds towards resource materials and documentation.

We also wrote letters to embassies, private companies, and other local and international organisations that might be willing to provide financial assistance for the Roadshow. In this way we managed to raise enough funds for all the activities we wished to take place and for the publicity materials. This also helped to publicise the event locally. For an organisation to put money into an activity of this nature, it must also fit their own policies and aims. For example, for the local mining company, Debswana, it was a way of attracting potential future employees. For SIDA the gender issue is one they like to promote; for some companies it was a way of publicising themselves.

Accommodation and food for students and teachers, all local transport, and part of the printing costs were financed by the Botswana Government. Hotel and travel expenses for local resource people were covered by the organisation or institution they represented.

2.2 Professional input

The second issue we tackled was to find the human resources. A letter was sent to all concerned ministries, private companies, training institutions and professional organisations who make use of or are involved with scientists/technologists and who, we thought, would be interested in promoting an activity to increase the output of people with such skills. The purpose of the letter was twofold: (i) to identify people who would like to be involved in organising this event, and (ii) to identify women in scientific and technical jobs in Botswana, who would be able to serve as role models during this Roadshow. Many organisations did not respond immediately and a personal follow-up visit was necessary. A few ministries and private companies provided us with names of potential role models. A few people rang or wrote to say that they would like to be involved in the planning and organisation of this activity. Several training institutions, and in particular the University and the Polytechnic, indicated special interest.

This exercise of finding the 'right' people took several months, but it was worth the effort. We managed to recruit a number of enthusiastic and willing committee members. The organising committee(s) ended up with representation from several sectors of the community, including departments of the Ministry of Education (Secondary Education, Curriculum Unit, Bursaries Unit, Guidance and Counselling Unit), the Ministry of Health, Water Utilities Corporation, Information Department, private companies, embassies, National Commission for UNESCO, University, Polytechnic, Teacher Training Colleges, National Institute of Research and schools. However, we forgot one important category, namely students. We did not involve secondary school students in the planning, but we did use them for trial testing some of the activities.

2.3 Brainstorming ideas

Not having a model to go by, we decided to bring all interested parties together for a half-day brainstorming session. We had already at this time identified four major areas requiring action, these being (i) career guidance, (ii) activities, (iii) publicity, and (iv) documentation. We split the participants into these four groups according to their choice. Each group listed ideas related to their topic, which were then discussed in a plenary session. This was indeed a very useful session and we now had a sufficiently long list of ideas to select what we wanted to do. A copy of the ideas from this meeting is shown in figure 3 on page 25-26.

2.4 Setting up committees

Judging from all the ideas that had come up, we realised that there was going to be a lot of work. Having one large committee handling a wide range of issues would have been too slow and ineffective. We also had to consider that all volunteers also had their normal full-time jobs as lecturers, administrators, doctors, engineers, etc., and that work had to be divided. We therefore decided to set up a number of smaller committees. Since we had already identified some areas requiring action and some interested people, we now asked each person which committee or committees they would like to join. In addition to the four areas listed above, a fifth committee was established to handle matters related to welfare, that is, accommodation, transport, invitations, prizes, etc. A sixth committee was set up in Francistown, in the north of Botswana, where the Roadshow was to proceed after Gaborone.

Group 1: Technical/Scientific student activities

1. Hands-on exposure to computers. UB computer department to be asked to help. Simple program required. Ask Computer Dealers to make computers available for the Francistown show. This activity could be paired with another activity to reduce on the number of machines required.
2. A 2/3 hour session, e.g. at the Polytechnic, doing something with their hands. Activities which may be new for many girls are, e.g. soldering, planing wood, drilling a hole in metal or wood, filing metal etc.
3. A practical group activity with an element of competition.
   Example (i): assembling a working model with instruction, e.g. a bicycle. Group which completes first, wins. The bicycle was suggested as it is a common object; we all know what the final product should look like; the parts are large and easy to handle. Polytechnic to provide the tools. Source of bicycles to be investigated. If paired with another activity, about 7 bicycles will be needed (groups of 4 or 5).
   Example (ii): /a cheaper version/ dividing students in small groups and ask each group to construct something in 1 or 2 hours, e.g. a bridge, a tower etc., which later is tested for strength / use of simple, cheap materials/.
   The winning group is the one who produces the strongest structure.
4. Some kind of a quiz, written or oral, with a problem to solve (application/higher ability question)/ individual.
   Figure analogy; mathematical puzzles; Chinese puzzles etc. or things like 'list various uses of bricks'.
5. Open-ended practical activities. E.g. give students a short brief of scientific research methods; then present them with a list of possible things to investigate,
   e.g.
   are participants' footlength related to their height?
   does the size of leaf on a plant depend on its position on the stem?
   Some leaves of trees are eaten by caterpillars or other insects.Do they eat at random or is a certain pattern detectable?
   Is the stretch/extension of a rubberband under a given force different at different temperatures? etc.
   Students choose one thing and in groups of about 3 investigate this, make a report and then present. The big group can be devided into say 3 class size groups , working in different laboratories and reporting within that subgroup.

Group 2: Career guidance

1. Provision of available and relevant career booklets/videos: e.g. Maths and Science Teaching as a Career; Medicine as a Career; Booklets from Companies and Institutions (Polytechnic, Debswana, ATTS) and 'Considerations on making career choices', a booklet compiled by the Gender Network group. Career video under production for PESC.
2. An address by some authority on career available and a briefing at stations by role models(women who have chosen scientific/ technical careers). Demonstration and slide shows by role models may reinforce.
3. A video show of the role models at their place of work would also be of help (time). Possible rolemodels include an audiology technician (Ramotswa), Polytechnic graduates, Air Botswana pilot, Architect Buildings Dept, Mechanics/graduates Auto Trade Training School, veterinary medicine etc.
4. An address by Bursaries Dept. on projections of training needs.

Fig. 3 Extracts from minutes of 'brainstorming' meeting

5. Interview with students who intend to take some courses that are 'normally' taken by men. Interviews can also be used to test communication skills.
6. Essay competition, prior to roadshow, on 'Why I (as a girl) want to go into a science/technically oriented occupation' or 'Why I (as a boy) think girls should go into science/technically oriented occupations (normally undertaken by men)'.
7. Questionnaires: job preferences and why? to determine attitudes prior to and before the roadshow.
8. Study visits to places of scientific/technical interest; in small groups; ideally where rolemodels are working and where employers may give encouragement,
   e.g Botswana Agricultural College, Polytechnic, Mines Department, Telecoms, Roads Departments etc.

Group 3: Publicity and Documentation

Publicity:

1. Posters a) One for the roadshow itself
   b) Women in their occupation + slogan
2. Broadcasting about the show via Radio Botswana, e.g. 'Teachers' Forum' and 'Round Table' (in both English and Setswana)
3. Gaborone and Francistown TV; present them a programme on a video tape.
4. Stickers, e.g. 'I like girls in Science'
   'COMSEC STME roadshow'
   'Welding is for girls' etc.
5. Pamphlets (see posters)
6. BOTSA(Botswana Science Association)/MAB (Mathematics Association of Botswana) newsletters: joint special issue on 'Girls and Science"
7. Drama; Reetsanang-groups. Information to the schools; possibly a prize for the best.
8. T-shirts (to be distributed before the show?) for all participants. Picture on fron/text on back. Text: COMSEC STME Roadshow for Girls August 1990.
9. Advertisements in Newspapers, both Govn. and private.
10. Press Conference before roadshow.
11. We need a housestyle; 'logo'

Documentation:

1. Resource book prepared before the roadshow
2. Video to be filmed before the roadshow showing rolemodels in action at work. Video filming during roadshow.
3. Produce a short report/picture booklet for the participants to take home on the last day of the roadshow; based on daily reports produced by students. Selected students to be asked to write reports on events.
4. Official report for the roadshow.

Fig. 3 Extracts from minutes of 'brainstorming' meeting

Although we had started fund-raising and recruitment quite early, the real committee work only started about two-and-a-half months prior to the Roadshow. To avoid the intense time-pressure this created, work ought to start earlier, especially when you want to produce and print resource materials prior to the Roadshow. In our case the ideas for a poster, a pamphlet, a resource booklet and a role model video were developed quite late and therefore committee members had to work week-ends and late nights to get it ready on time.

Each committee had 6 to 12 members, each selected a chairperson and a secretary. Minutes of meetings were produced and circulated to this and other committees whenever time allowed. Some people chose to be members of more than one committee. Sometimes the work of one committee overlapped with the work of another and coordination was necessary. The three coordinators formed the link between the various committees, and coordinating meetings involving all committees were held at intervals. In some cases sub-committees were set up to take action on specific issues, or other people were brought in wherever special expertise was required.

Each committee then looked into the proposed ideas to see what could be implemented. Below we have documented the ideas we decided to implement, how we went about preparing for them and how they were used at the Roadshow.

3. PREPARATION OF RESOURCE MATERIAL

The most time-consuming part of the preparation was the preparation of the resource material. We wanted to put some effort into this to produce something that would not only be used for the Roadshow but could also be a source for further career activities in schools. As mentioned earlier, our fundraising efforts were successful and we had enough funds to carry out all projects we thought would be useful.

3.1 The Roadshow Logo

First we designed a Roadshow logo which was then used on the various publicity materials, such as car stickers, folders, posters, etc.

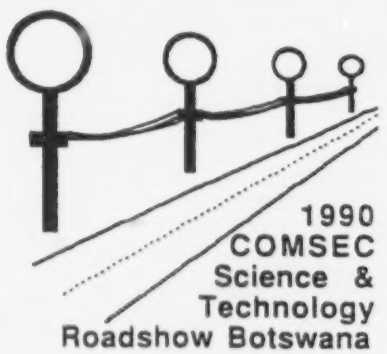


Fig.4 Roadshow Logo

3.2 Role model videos

The most important strategy for this Roadshow was to use role models - women who have opted for and succeeded in a scientific or technical career. Since the Roadshow was to run for two days only at each centre, we realised that there would not be time to visit many role models. We therefore decided to film a few role models at work before the Roadshow to produce a series of role model films. The committee helped to identify suitable role models and a professional film-maker was hired for the filming. The result was a series of three short films featuring (i) a pilot and an aircraft maintenance technician, (ii) a civil engineer, and (iii) a wildlife biologist. These were used during the career guidance clinic described below.

3.3 Colour poster with slogan

The objective of the Roadshow was not only to attract girls into scientific and technical careers, but also to dispel the myth that such careers are only for boys. To publicise this message we decided on an attractive colour poster with an appropriate slogan. For all photography we hired photographers with high professional standards. The picture chosen for the poster is a female telecommunication technician in overall and helmet pictured against the satellite disc at the telecommunication earth station. Choosing the slogan was quite an exercise, but we settled for something simple that included the three key words: women, science and technology. The Roadshow slogan, **Women make it in Science and Technology**, not only features on the poster, but on all publicity materials described below. The poster was distributed nationally, to schools and public places, before the Roadshow. It also provided a good wall display for the Roadshow itself (see photo page 7)

3.4 Publicity pamphlet

Interviews with students who had been selected for the University Pre-Entry Science Programme revealed that they have a very meagre knowledge of the range of scientific and technical careers available to them in Botswana. Many parents are likely to be even less well informed. We therefore decided to produce a pamphlet to educate the public on the wide range of careers available and information on how many people the country needs to train every year for each career to meet our manpower needs in the field of science and technology. This was produced as a dictionary with a reversed gender-bias (see figure 5). We concluded that 'to fill all these places, both girls and boys must apply'. This was produced in colour to attract more readers, and was distributed to everyone who turned up at the Roadshow: students, teachers, parents and the public in general. Like all other resource materials produced, sufficient copies were produced for distribution to all schools and national libraries.

3.5 Advertising poster

To make the public aware of the open sessions of the Roadshow, we also needed a poster to advertise this. Since it was a poster for one-time use it had to be cheap, so we printed it in black and white and used regular paper quality. But our great advantage though was that we had access to Macintosh computers and a laser printer. This enabled us to produce text of high quality and to pass on photo-ready printer copies to the Government Printer.

How many different careers are there in Science and Technology?

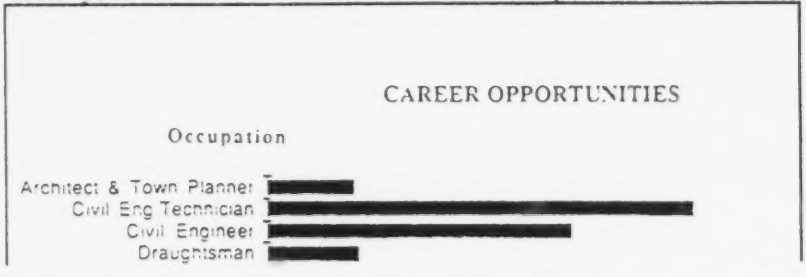
The list below gives you some:

Aeronautical Engineer
Agriculture Teacher
Air Craft Maintenance Engineer
Analytical Chemist
Architect
Audiologist
Audiology Technician

Mathematics Teacher
Mechanical Engineer
Mechanical Eng. Technician
Medical Laboratory Technician
Metallurgist
Meteorologist
Microbiologist

How many scientists and technologists does Botswana need?

In almost all science and technology occupations, Botswana needs more qualified people. The bar chart below shows how many additional citizens are required each year to fill a number of such occupations.



A telecommunication technician is a woman who installs and maintains telecommunication equipment, i.e. telephones, telexes, telefaxes, switchboards etc. She operates and maintains equipment for transmitting microwave signals. She is also able to maintain computerised telephone exchanges. The training takes about two years and is done both at the Botswana Polytechnic and at Botswana Telecommunication Corporation. Some trainees also attend courses abroad to familiarise themselves with the latest developments in computerised telephone systems.

Please note, all described occupations in this folder are also available for men!

Fig.5. Extract from publicity pamphlet

What makes women choose a career in science and technology?

Getting sponsorship

Almost all Batswana students in post-secondary education are sponsored by Government. This means that they do not have to pay any fees or pay for accommodation, food o[r] small stipend to c[over] expenses. In return, [they] they have to under[take] in a place decided after finishing th[eir] bonding depends [on]

However, being that governmen[t] most cases yo[u]

What about working with men?

"At the beginning of any project there problem when I, as the only woma chairing a group of 15-30 men. But al they get to understand [that I know tha professional and [my job forget [it is pl

Do you need to be special to become a scientist?

"I am the last born of a large family of nine children. For most of my life I lived in a family headed by a woman, my mother, because my father passed away when I was four years old.

My mother never had a job, but like all mothers and housewives living in the non-urbanised regions of the country she was a farmer. So we lived off the soil. Agriculture is a labour intensive indust[ry] in developing countries and this [is] all were employed in this [way] school [fees]

Do you have to lift heavy things ?

"When I told my moth[er] electrician, she asked me thought it was heavy fo I'll see as time goes on that for that career ther for a lady to cope and t[hat] are not determined and want to be you will nev the people are not used boxes or putting on o[ne] teasing you and make all you especially those you people, especially those w will always congratulate auto electrician, Botswana)

"Engineering needs brains, not muscles!" (*Mary Obeng, civil aviation engineer, Ghana)

This picture is taken from a Dutch publication titled "Meisjes (en Jongens) in Jongensvakken" A.P.S. Amsterdam.

My day at work

...as an architect
"Architecture is not a 07 30 to 16
variety of specific tasks which
employers and clients - design
work, negotiating with construc
are done I put ideas into
places of interest, read, talk
redesign my own and othe
(Neo Modisi, architect, Bo

...mauane.

an when, as a small girl, I went with the ting water or fire-wood. I used to get mad had to carry mine on the back and the made carts which they could just push y were[n't] [I] been to let me use their [own]

Can women scientists find husbands?

"If a man finds you attractive, seeing you holding a screwdriver will not put him off....." (*Mary Obeng, civil aviation engineer, Ghana)

[to be] an architect) is quite long, but can [be] tween the ages of 23 to 26, and I do causes problems for women and are still quite eligible at 26! It other person, if he found you in that understand what the work [involved]

What makes the work interesting?

Surprisingly it is meeting and sharing information with people of varying knowledge that I enjoy in my work. In particular I enjoy working in rural areas although well educated and concerned academics have had a lot to give to me. It is also the practical aspects of transferring very basic technology to people with just the hands to do it and the eye to observe that I find most interesting. This is particularly important to me because most traditional foresters feel that forestry is a special subject few people understand and appreciate that the ordinary public [is] Walk[ing]

Where can you train?

In the table below you can find all major post-secondary training institutions in Botswana for science and technology related careers. Opposite the training institution you will find some of the careers they train for. Neither of the lists, training institutions nor careers, are complete. For more detailed information on training opportunities in Botswana, please refer to 'Preparing for Jobs - Training Opportunities in Botswana', published by the Directorate of Public Service Management April 1987; available in School libraries and National Libraries.

Training Institution	Careers
Botswana Agricultural College	Diploma & Degree Courses Agriculture Teacher Agricultural Officer Crop protection Officer Crop production Officer Research Officer Livestock Officer Certificate Courses Demonstrators Veterinary Assistants
	Diploma Courses Science Teacher Mathematics Teacher Design & Technology Teacher

Fig.6. Extracts from Resource Booklet

BEST COPY AVAILABLE

3.6 Resource booklet

Another way of exposing students to more role models than they could meet during a two-day Roadshow, is to write a book - or at least a booklet. We went around to various work places, photographed women scientists at work and asked them to write about themselves. As a guide we had prepared a questionnaire with questions such as: What made you take up a career in science/technology? What skills and talents are important in your job? Describe your daily activities at work. How do you combine your profession with your family life? What interests you most in your job? What do you find hardest in it? etc. Using headings based on these questions, we produced a small booklet with quotations from these role models together with black and white photographs of these women at work. Extracts are shown in figure 6 on page 30.

We also went round to all institutions that train people for scientific and technical careers to collect information on their courses. At the back of the book we listed the careers each training institution trains for and to what level. We also included information on how to apply for scholarships, an address list for all training institutions and an address list for a number of sponsoring organisations. Due to pressure of time the lists may not be complete, but we decided a 'not perfect' resource booklet was better than no resource booklet. Very little material of this kind had been produced in Botswana previously, so this was at least a start.

3.7 Photographic display

By using enlargements of the photographs for the resource booklet and selected quotations, a wall display was prepared for the Roadshow.

4. SELECTING AND INVITING PARTICIPANTS

We decided to aim at senior secondary school students, age 16-18, who already had chosen scientific and technical subjects and had shown some interest and aptitude in these subjects. Our experience is that girls, even if they have done these subjects in school, are diverted into non-scientific careers after school. In addition to the three students per school selected by the headmaster, winners of our local national science/mathematics, agriculture and technical fairs were invited. All activities were designed with this target group in mind.

The need also to invite younger pupils, the ones who have not yet chosen their subjects for senior secondary, was recognised by the organisers. This would, however, have involved too many schools for a Roadshow at national level. It was therefore agreed that the follow-up activities at district level, or at village level, will include pupils from junior secondary schools.

The foreign students were selected by their Ministries and, in most cases, were students who had shown aptitude in these subjects by participating in and winning national fairs and competitions.

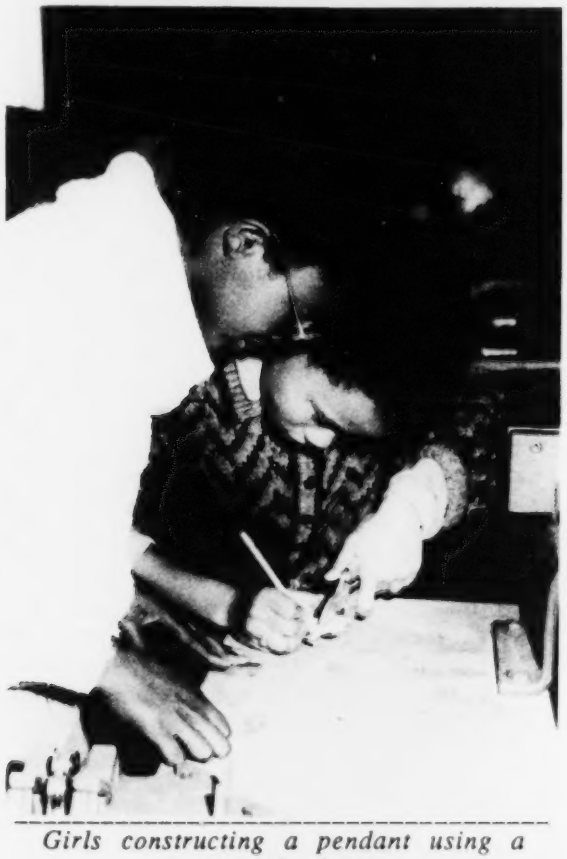
5. PREPARING FOR AND RUNNING TECHNICAL ACTIVITIES

5.1 Using workshop tools

Aim of this activity

To

(i) familiarise students with a workshop situation
(ii) create confidence in handling basic tools
(iii) complete a meaningful technical project within a period of two hours
(iv) motivate the participants to consider a technical career



Girls constructing a pendant using a personal design

Preparation

The main task was to identify a meaningful project which could be completed in two hours, involving simple workshop techniques such as cutting, shaping, soldering, drilling a hole etc. A choice of artifact should be available to accommodate the natural preferences of both girls and boys.

Suitable materials had to be identified, taking availability and cost into account. Wood, metal and acrylic were identified as suitable and easy to work with.

Student getting exposure to workshop tools

Facilities such as workshop areas and tools for use by about 60 students simultaneously had to be found. In the interest of safety, we decided on group sizes of twenty participants. Smaller groups would have been preferred so that more time could have been spent assisting individual pupils. A minimum of three workrooms were therefore required, and the possibilities were either

(i) to use a cluster of schools within a small geographical area which could each offer the use of a wood/metal workroom; or alternatively
(ii) a single institution that could offer a minimum of three workrooms.

In our case the Botswana Polytechnic, which is ideally equipped for such activities, was available for the Gaborone Roadshow. For the Francistown Roadshow we made use of the Design and Technology workshops in three different schools. In choosing the workroom facilities, the committee had to look out for potential 'bottlenecks'. In other words, they had to make sure that tools and workstations were adequate for the number of pupils anticipated. This was particularly important if the artifact was to be completed by all participants.

Since a major thrust of the Roadshow was to encourage the active participation of females, efforts were made to have female Design and Technology teachers managing these activities. It was also considered essential that some technical experts should be available to assist on the day in case any unforeseen events should occur which required items of equipment that had not been anticipated, and that there should be a workshop assistant for each room.

Artifacts/Projects.
The Gaborone Committee settled for a choice of two projects. These were

(i) a pendant
(ii) a key fob.

These two items are essentially similar, the difference being that one was finished with a key ring, and the other was hung on a chain. (Both key rings and chains were available, and participants were provided with the one of their choice).

The key fob/pendant project was designed so that participants could develop and create an individualised personal pendant shape and then mount a small copper design on its surface. The copper design was made in wire, and was based upon the logo design adopted for the Roadshow.

Again, because of shortage of time, and also bearing in mind that some participants may have had little if any previous experience with tools and processes, it was decided to make construction and assembly procedures as simple as possible. Thus acrylic sheet was selected for the pendant backing. This is easily worked, does not require specialised tools, and the surfaces are pre-polished. After the pendant had been cut and filed into shape, only its edges required polishing.

Similarly the logo (made from common household electrical wire) was fastened to the acrylic with an epoxy resin glue which had a very fast curing time.

The only potential 'bottleneck' in this project was the drilling of holes for the key ring/chain, and the supervisors had to be aware of this throughout the session. A number of spare drill bits were also available to allow for the possibility of breakages.

The Francistown team settled for three different projects, one for each of the three school bases.

These were
(i) Designing and constructing a ball bearing game
(ii) Designing and constructing a 'steady hand' game
(iii) Designing and making a pendant

Each student did one project only. Project (i) involved *designing* a game in which a ball bearing would be placed in a maze and manoeuvered through the maze, without falling through a hole, to a final resting point - the finish. The maze was then *constructed* using acrylic materials, various tools and glue. Project (ii) was similar and involved *designing* a game in which a metal ring had to be moved along a metal wire without

touching the wire. In other words, a game to test how steady your hand is. Again the students first had to design the shape, making sure the game wouldn't be too easy nor too difficult, before they started the *construction*. Project (iii) was similar to the Gaborone one.

5.2 Making a musical instrument (a marimba)

The most ambitious project was the making of a marimba, an African musical instrument. The idea came from one of the organisers who had successfully made a small marimba at home according to technical specifications received from others who had studied, experimented with, and played marimbas.

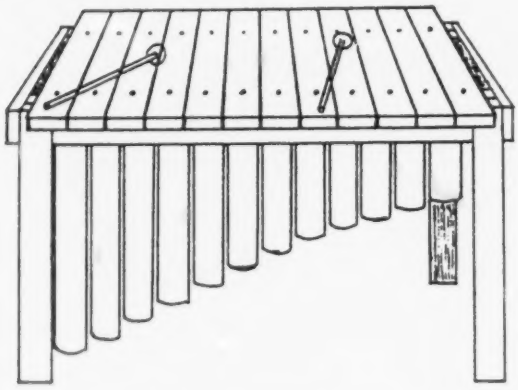


Fig.7. A Marimba

Advance preparation

Most of the technical operations to produce the instrument were ordinary wood-working operations, including the hollowing out of the wooden keys on the under-side. However, to do this with an adze is a long job, so an alternative way to do it was looked into using a circular saw to make cross-cuts quickly. It seemed to give results of an acceptable quality. We intended that, since the job needed repeating many times, the number of students in a group would be adjusted to get the job into the 2-hour period available.

A sketch plan of the finished instrument was used to determine the quantities of materials needed. We seriously underestimated the time needed to obtain the rough timber and machine it down to convenient pieces ready for use (about 6 days in all, rather than the 2 expected!). We chose to use mukwa (pterocarpus angolensis) since there were few other timbers available, but we also knew that it was suitable.

With the materials to hand a provisional plan was made and a prototype instrument constructed to see that the plan was workable. The provisional diagrams and instructions were then modified as required.

The intention was that, as far as possible, students would work independently from the printed instructions, asking for help from supervisors when they felt the need. In addition to the technical supervisors for this project, at least one supervisor would need to have enough of a musical ear to help the students with the tuning.

Since only a two-hour period was available for the marimba assembly, it was necessary to prefabricate a number of items. An important detail that made for smooth construction of the frame, was that for each lap-joint we pre-drilled the holes for the screws and marked the surfaces that were to contact each other with the same number. We did this using a simple jig constructed for the purpose.

The cost of the consumable materials that were used we estimated to be about Botswana Pula 500 for the eight marimbas that were built. At a rough estimate, the preparation required 15-20 man-days. This could have been shortened a lot if we could have obtained the timber already machined to size. Several of these man-days were spent in drawing up the instructions (see figure 8 on page 39).

How the session was actually run

For this project we ran two sessions, each with 30 participants. In each session we had 4 groups of approximately 8 students. The kit of parts already packaged for each group was set in each group's working area. The printed instructions were given to each group with general introduction. Participants responded well to the brief and understood what was required of them. It should be noted that they were high-calibre students and needed minimal supervision.

The three stages in the completion of the marimbas were:
1. assembly of frame,
2. key-tuning,
3. resonator tuning and fitting.

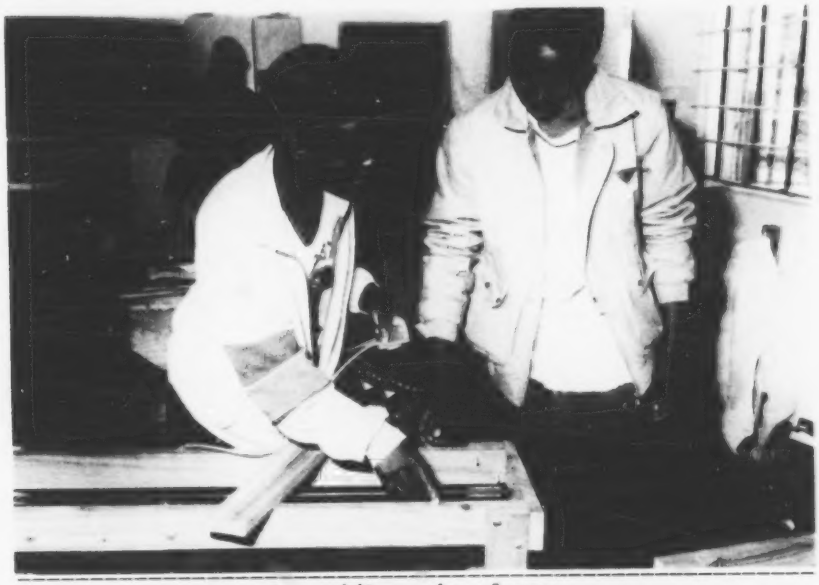
The framework presented few problems as the parts had all been pre-drilled and numbered for speedy assembly. An electric keyboard was used for checking the tuning of the keys. The resonators were not all carefully tuned and did not appear to make much difference to the sound in practice, though during the advance preparations they did significantly improve the sound.

The 2 $^{1}/_{2}$ hours proved to be a little short. Three hours would have proved adequate.

None of the groups completed their marimbas in the time allowed, though they all had a completed frame assembly, several tuned keys, and resonators. Some students returned for a further 30 minutes later in the day to finish 4 marimbas in that time.

Considering the quality of the product, the financial input was reasonable. The high quality of the instruments was largely due to very thorough preparation and planning. The instructions for the marimba assembly, as well as more detailed information on preparation and running of the event, are available on request.

STAGES OF MARIMBA ASSEMBLY



Assembling the frame

Cutting a resonance tube

BEST COPY AVAILABLE 42

Testing for resonance

A quality check

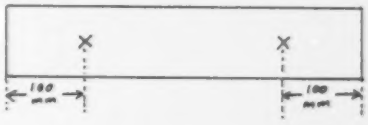
BEST COPY AVAILABLE

4(b) Making the Keys

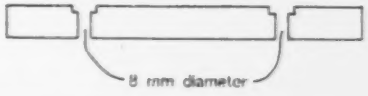
Your group is provided with 12 bars of wood. Each bar is made of straight-grained brown mukwa wood, and is 450 x 70 x 25 mm.
You have to turn these bars into 'keys' by (a) drilling them and (b) tuning them.

(a) Drilling You need: ruler, pencil, tri-square. Pillar drill & bits. Sanding block.

1) **Mark the points where to drill as shown in the diagram below. (Use tri-square and ruler.) Be exact!**



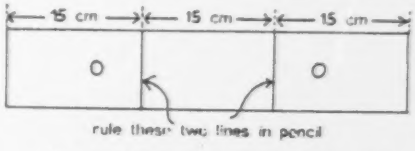
2) **Next, put an 8 mm 'twist drill' into the machine and drill all the way through the wood at each point, so it's like this:**



Don't forget to put a flat piece of scrap wood under your work, as you drill.

(b) Tuning (You may need help from someone with a confident 'musical ear' to complete this!)

1) **On the 'lower' side of the wood, mark the middle 15 cm of its length.**



rule these two lines in pencil

All cuts will be made between these lines!

2) You now try to tune this key to one of the 'white' notes indicated on the electronic keyboard.
How do you do this?

ay down to the

t the circular saw

sfully controlled.

DE.

re.

not change the note

This means that, if you have to get your key just a little bit lower in pitch, you can either add one or two more cuts (of the same depth) or make the cuts a little bit deeper.
The first of these is probably easier.

7) **You will have to take the key from the circular saw to the keyboard and back again a few times until you have got the note just right!**
Be patient. It will get easier with practice.

Now you have made a key, what do you do with it?
Two things: (1) Mount it on the frame.
(2) Make a resonator of the right length to hang under it.

Fig.8. Extract from the 'Notes' on the manufacture of Marimbas.

14

6. EXPOSURE TO COMPUTERS

6.1 Setting up a computer laboratory

The biggest problem associated with the organisation of a computer activity is obviously the availability of hardware. In our case we had no problem at the University of Botswana venue as the University already has a room with 30 computers which we could hire for a morning. However, at the northern Botswana venue, Francistown, there was nothing. The way we solved this problem was to approach three local computer dealers in Gaborone and request each of them to make available five computer for the Francistown Roadshow. This they very kindly agreed to do. Each computer dealer drove the 440 km north to provide us with both computers and resource people. In this way we managed to set up a computer laboratory with 15 computers. By dividing the students into two groups of 30, and having 2 students per computer, the problem was solved.

The content for the activity was carefully planned and a manual written in time for the Roadshow.

For both venues IBM compatible machines were used, 640 kB, stand alone, 360 kB floppy disk drive, monochrome screen.

Students were working in pairs (a boy and a girl if possible). A brief introduction to computers was given where input, processing and output was mentioned. The keyboard was introduced and all keys needed later were shown and explained (letters, numbers, shift, spacebar, enter, escape). After the introduction, which took approximately 15 minutes, the participants were asked to work on their own following the instructions in the manual. Assistance was given whenever any of them asked for help.

We had two students per computer

6.2 The software

Eleven small programs written in GWBasic were used. The aim was to show how the computer can be used for different tasks and will behave differently depending on which program is loaded. Some of the programs were like games in order to create interest and attention. Below is a short description of each program:

Make acquaintance: The participant was asked to answer four simple questions. The program then included the given answers in a sentence.

A letter: One again they had to answer a few questions and the program displayed a letter to their parents with date, names etc. included.

Making random sentences: After having entered a number of nouns the program created random sentences.

Reaction time: Their reaction time was measured.

Enter letters: Ten random letters were displayed one at a time. The aim was to copy them as fast as possible. The average time to type each letter was measured and displayed.

Put in alphabetical order: They were asked to type their surnames. The program then showed how the letters could be arranged in alphabetical order.

Guess a number: A game where the participants (or the computer) should think of a number between 1 and 1000. The computer would then guess the number and the participant had to answer 'too high' or 'too low' until the correct number had been found.

Exercises in spelling words: English and Setswana words were shown for a short time. The aim was to type the word and spell it correctly. If the word was spelt wrongly it was displayed and the student was given a new chance.

Draws rectangles: The programme drew a number of rectangles on the screen.

Love: a name of a friend was typed in. The program filled the screen except for the space which made up the letters LOVE.

Geography: A quiz program with the aim of checking if the students knew towns and countries in southern Africa.

The first program was already loaded when the students came in. They only had to type 'run' to start the program. After a few runs they continued with the second program and thereafter they were asked to load the menu and choose any option.

This activity worked well and could easily be used anywhere else. The programs which we used can be obtained from:

Hogeschool Holland
Wildenborch 6
Diemen
Holland
Tel: 020-5601231

7. ORGANISING COMPETITIONS

7.1 Bicycle assembly

One of the ideas that came up in the initial brainstorming meeting was that if the students carry out technical activities they may as well have a useful practical application; hence the idea of the bicycle assembly. The biggest problem here was of course how to get hold of a minimum of 10 identical bicycles. Fortunately the Government Stores agreed to lend us the bicycles with an assurance that we would pay for any that got damaged during the activity. This was not a problem; the bicycles were assembled in their original condition after use and returned to the supplier.

This activity was run parallel with the computer activity. Hence we had two sessions of 30 students. For each session we had 10 groups of 3 and, as with all other activities, they were well mixed in terms of sex and nationality. The activity was run as a group competition. The assignment was to assemble a bicycle using the instructions and tool kit provided; then to ride the bicycle to prove that it was correctly assembled and safe to ride.

This activity was trial tested on girls of a similar age group to estimate how much time was required and to check if the instruction could be understood. From the outcome of the trial testing we found that the instructions were not adequate and that it would be necessary to provide an already-assembled bicycle for students to look at. An eleventh bicycle was provided for this purpose.

The students who actually attended the Roadshow were extremely intelligent and able and in more than one activity they took us by surprise. Not a single group required the full 2 hours we had assigned to the bicycle assembly.

7.2 Building a bridge

Some of the readers will be familiar with the term 'egg races'. The type of egg races we used could also be called 'engineering games', games in which students design and build a structure which is strong and stable.

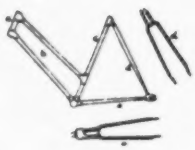
We had access to the UK publication 'More ideas for egg races' compiled by the British Association for the Advancement of Science, which provides a lot of different ideas. The committee decided on a bridge for Gaborone and a tower for Francistown. The decision was based on the following: both activities had been tried out previously by members of the committee; the materials required are cheap and easily obtained; they were regarded as easy to judge.

Welcome

to the bicycle workshop!
You want to learn how to repair a bike? Here is your chance!
So roll up your sleeves and get ready to start

Have a nice time !!

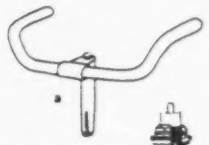
(and don't bother about dirty hands)

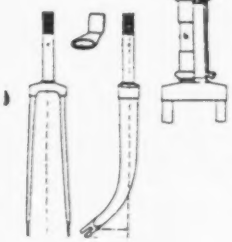


1 The frame

This is the skeleton of the bicycle; all other parts are connected to it directly or indirectly. Have a close look at the different parts of it:

a steering tube
b down tubes
c seat tube
d seat stays
e chain stays



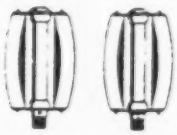


2 The handlebars

Consist of 3 parts:

a the handlebars
b the handlebar stem
c the front forks

Fit the handlebars on to the frame you need the appropriate tools!



3 The pedals

Fit the pedals to the cranks. Mind you, there is a left and a right pedal!

4 The wheels and the chain

Fit front and rear wheel. When you fix the rear wheel, make sure you put the "eye" (b) within the stays ends (d) and the chain tensioner (a) in the right position. Then fit the chain (lift the rear wheel and turn the pedals). Use the chain tensioner - the nut (c) - to adjust the chain to the right tension (e).

5 The saddle

Fit the saddle on to the frame and adjust to the correct height: when you sit on it with a stretched leg your heel should touch the pedal.

6 The tyres

Your bike is almost ready! All you have to do is to pump up the tyres.....

HAVE A NICE RIDE

Fig.9. Instruction for bicycle assembly

Figure 10 shows the rules for the game and the materials required. There is no fixed set of materials for games of this type; our list is quite an arbitrary one. When trial testing activities of this nature, it is important not only to test the type of material but also the quantity. We discovered during the event that we had provided too much sellotape for the bridge. The size of the roll of sellotape provided for the actual run was larger than the one used in the trial. The danger here is that the strength is provided by the sellotape, not by the structure.

The time provided for the building was one and a half hours; to this one must add 15 minutes for instructions and 30-60 minutes for judging. We had about 24 groups of 3 (some were teacher groups) for each venue. To make the judging exciting it is important to have all participants in one room, e.g. an assembly hall or a large dining hall.

For the judging of the bridge we had arranged a large pile of house bricks just outside the door. Each group was asked to put on 1 brick, then a second brick, then a third brick etc.... all at the same time. We had under-estimated the strength of the bridges and, after a while we ran out of bricks. Groups now had to collect bricks from those whose bridges had already collapsed. Many of the bridges took 15 bricks and the winning bridge took 20!

The tower took about 5 bricks.

BUILDING A BRIDGE
Group size: 3

Your task:
is to build a bridge (e.g. between table legs) , at least 1 meter long, that can support as many house bricks as possible.

Time: 10 minutes for planning
1 hour 30 minutes for experiment and development

Materials:
A4 paper, 100 sheets
cellotape, 1 roll
gluestick, 1
scissors, 1
pencil, 1
drinking straws, 1 pkt
kebab sticks, 1 pkt
metre rule, to measure
house bricks, for testing

The winning team
will be the one that has constructed the strongest bridge.

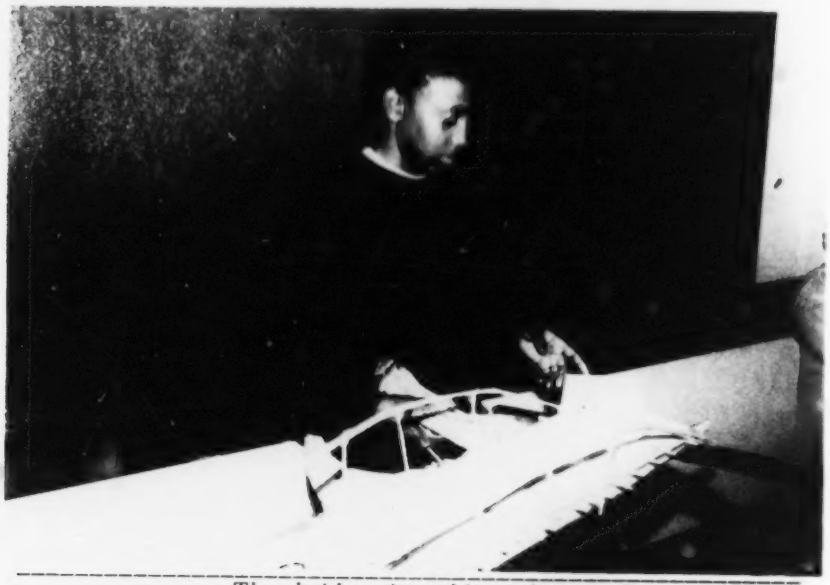
Fig.10. Instruction for bridge

STAGES OF DESIGNING AND BUILDING A BRIDGE

The planning stage

Getting on with the task

BEST COPY AVAILABLE



The bridge is taking shape

Time for judging

BEST COPY AVAILABLE

7.3 Solving puzzles

In every activity we tried to include fun and enjoyment; this also applied to the quiz. We wanted a quiz that did not test school knowledge, but which stimulated thinking; this is how the ideas of puzzles came up.

This activity was planned as a quiet type of evening activity, where the students were arranged in groups of 3 at small tables. Each group was given a question paper (see figure 11), a pencil, a tangram puzzle, a string puzzle and paper for the origami.

The questions were quite varied: the first two were quite simple, the third required more logical thinking, the tangram puzzle required more use of the brain, the string puzzle was a real IQ test, and finally the folding of the paper frog and the high-jump test were a way of scoring 'easy marks' after all that strenuous thinking. A similar but not identical quiz was used in Francistown using similar equipment, and having the best-flying paper aeroplane as the last question.

We assigned one hour for this activity. Each correctly-solved question carried a mark as shown in figure 11. Each group had a mark sheet where the judges (a number of them were required) recorded the marks whenever a group had solved a question.

While trial testing we found that both the tangram puzzle and the string puzzle could be time-consuming, but because of the way the judging was done it was not necessary for the groups to complete all questions. The group with the highest score would win.

Again we underestimated the ability of these girls and boys. The first, the second and the third teams finished all questions correctly before the end of the hour; time, not marks, therefore became the determining factor.

Chinese puzzles and other quiz questions were provided as one of the evening activities

BEST COPY AVAILABLE

3. I need two lemons desperately; but these lemons are available only at a distant place which can be reached only after crossing 5 border posts. The duty for lemons are as follows.

   If you bring a certain number of lemons, customs officials count them and take half of the total quantity at each border post; but at each post they give you one lemon as bonus from their share.

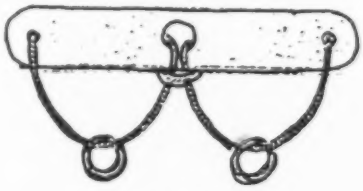
   How many lemons do you have to carry from the starting place so that you finally end up with two lemons after passing through 5 boarder posts? 10

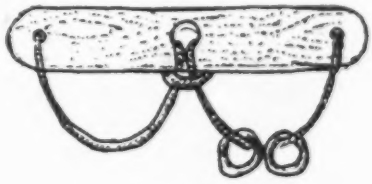
4. Use the TANGRAM puzzle.

   The rules are:
   (i) You must use everyone of the seven shapes.
   (ii) All seven shapes must be horizontal when they are being put together (not vertical or otherwise).

   Arrange the pieces into a shape as shown below. 15

5. String puzzle.
   Infront of you, you have a string puzzle as shown in the diagram. There are two large loops, each with a wooden marble.





   Your task is to transfer one marble to the other loop, i.e. so that the two marbles are next to each other 20

6. Follow the instructions below to make a jumping frog. 15

   After completing it, look after it well, because we are going to arrange a frog jumping competition.
   10 extra points for the frogs that can jump into the lid of the TANGRAM box.

Fig.11. Extracts from quiz questions

8. ORGANISING A CAREER GUIDANCE CLINIC

The career guidance clinic involved many people and therefore required a lot of planning and organisation. The intention was to cover as many scientific and technical careers as possible. As it would be impractical to have a room for each and every career, related careers were grouped together, e.g. health careers, geology and mining, etc. After deciding on the grouping, a coordinator was assigned for each career area. The coordinator was responsible for

(i) identifying suitable female role models for these careers
(ii) identifying resource people from the appropriate training institutions
(iii) putting together available career information
(iv) organise a display for the room/clinic
(v) planning a programme/procedure for the clinic sessions.

It is important that the role models/resource people know exactly what is expected of them at these career guidance clinics. Some coordinators were able to bring their resource team together prior to the Roadshow and were therefore well prepared. In other cases this was not possible because the resource people came from outside town (e.g. mining engineers) and were only able to arrive at the start of the event.

The set-up and procedure in the clinics varied as each coordinator was free to make the necessary preparations. The health professionals, for example, had brought with them a lot of hospital equipment and materials to 'set the scene' for the career talks. In the agriculture clinic, an attractive wall display was used to prepare participants psychologically to listen and to want to know more about these careers.

In the engineering rooms we had role models and trainers representing different levels of technical/vocational careers. The point was made that technical professionals are required not only at degree level, but even more so at technician and craft level. It was also explained how you advance from one level to the next.

A separate clinic was set up for general career information and questions on scholarships. This was staffed by officers from the Guidance and Counselling Section of the Ministry of Education, the Government Bursary Section, as well as private organisations offering scholarships.

Concurrent with these clinics, the role model video was shown in a separate room.

The clinic programmes ran in 20 minute cycles, and the idea was that students and the public could move from room to room in any order they wished using the timetable provided. This led to a rather uneven distribution and some students were still 'waiting to be told what to do' after the first 20 minutes. We then intervened and quickly arranged the students into groups; each group was escorted by a teacher to the various rooms.

After this learning experience in Gaborone, we were able to refine the procedure in Francistown. Here we started off by dividing both teachers

and students into groups; they were escorted around by a teacher for about 80 minutes, then given the opportunity to go anywhere they wished for the next 40 minutes. The video was shown to the whole group at the end of the afternoon. This approach was very successful.

9. ARRANGING STUDY VISITS

In a two-day Roadshow the time available for study visits is very limited. However, instead of taking all students to one place, we arranged a choice of ten places, each student to visit one place. The time available was two-and-a-half hours. The day before, after the Career Guidance Clinic, the students filled in a form listing three places in order of preference they would like to visit. It was not always possible to give students their first choice as we needed to have approximately the same number in each group.

During the preparation stage, a member of the organising team was assigned to each of the places to be visited. His/her responsibility was to make a pre-visit to the organisation to identify a suitable role model there with whom to plan and organise the programme for the visit, and of course to escort the students on the day of the visit. We specifically emphasised that we would like the students to get some 'hands-on' exposure at each of the work places.

Transport is of course crucial for an activity of this kind. Ideally one vehicle should be provided for each workplace to avoid unnecessary time delays.

Here a group is visiting a telecommunication engineer. It was not always possible to find female role models.

10. OPPORTUNITIES FOR DISCUSSION

In events of this nature participants, both students and teachers, have ideas they like to share and an opportunity to express these ideas must be provided. We planned two activities for this purpose.

One was a meeting of resource people and teachers to share experiences of different countries, to evaluate the Roadshow and to discuss ideas for follow-up and future cooperation. This meeting was timetabled parallel to one of the pupil activities. One point that was stressed here was the need also to expose younger pupils, i.e. junior secondary school students. Other target groups include parents, teachers and employers and the use of media (radio, TV) and seminars were suggested as ways of reaching them. Other points raised were the need to involve the private sector more in career guidance activities and that it would be interesting to carry out a tracer study on these Roadshow participants at a later date to see how effective a Roadshow of this nature is. A suggestion was made that visits to educational/training institutions could also be included in a Roadshow programme.

Meeting of teachers and resource people

The second was a panel discussion open to the public on the closing night. The topic for the discussion was 'The Role of Women in Science and Technology'. As panelists we had female role models, representatives from

BEST COPY AVAILABLE

training institutions and the employers. In future we suggest that students are also members of the panel. This, of course, assumes that you know the students well enough to identify those mature enough for this task.

We had a number of very competent and mature students amongst our participants and it was really during this panel discussion we 'discovered' them. We tried as much as possible to involve the audience in the discussion and a number of students took this opportunity to present their views. For instance, in response to the statement that no man would like to see his wife doing heavy work, a student responded that *'when we women are in the scientific and technical jobs we will design things to overcome this constraint'*.

11. PUBLICITY

In addition to posters and pamphlets the press is a useful resource when you want to publicise the Roadshow.

An important point here is to involve the press and media already in the planning stage, to provide press releases from time to time, and to ensure they receive copies of speeches. It may also be necessary to assist journalists with transport during the Roadshow to ensure they reach the places which are worth reporting on. Some extracts from the news coverage are shown in figure 13.

In our case we also made sure that there were some post-Roadshow publicity materials. Roadshow resource materials, including the role model videos, have been made available to secondary schools for use in careers lessons or Roadshow follow-up activities. We also hope the participants will wear their Roadshow T-shirts and use their Roadshow bags at school.

The car stickers were in high demand and are likely to provide good publicity around the country.

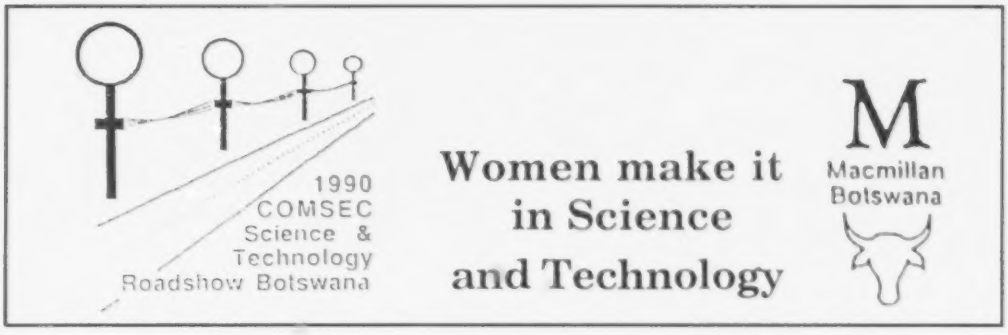


Fig.12. Car-sticker with Roadshow slogan

C'wealth secretariat plans to organise science show

THE Commonwealth Secretariat plans to organise a science and technology mathematics education roadshow in Africa to show women and girls that they could succeed in many more areas of employment if they sought the appropriate qualifi-

move from city to city in Africa, will be designed to have an impact on the attitudes and myths which prevent girls and women from taking advantage of today's opportunities in science and technology.

It says the fact that fewer girls opt for careers in

cal/scientific jobs in Botswana is going to be slow, it says.

Therefore, says the savingram, by not making full use of potential women scientists/technologists the localisation process will be even slower.

Participants during the

BOTSWANA DAILY NEWS AUGUST 17, 1990 No.158 PAGE 6

Science facilitates advancement of human endeavour - Molomo

By Rutang Moses

The Minister of Education, Mr Ray Molomo has said there is no doubt that science and technology

in the vocational and technical training fields.

According to Mr Molomo, it is now the priority objective of the

concerns of enhancing the participation of girls and women in science.

Mr Swartland said the urgent need to integrate

F' .DAY AUGUST 17 1990 THE GUARDIAN PAGE 5

Roadshow to remove womens' barriers

By Ernest Molol

THE theme of the roadshow - "Women in Science and Technology" also seeks

Speaking at the official opening of this occasion, the Minister of Education Mr Matlapeng Molomo said Botswana still lacked the

education.

Bending to the emphasis of the occasion, he said womens' grievances regarding training have always

much on the society's attitude towards women, Mr Molomo said.

"We have to stop thinking of, for example, engineering as a

getting enough female students into science and technology-based courses will be removed. I hope."

In his address, the Assistant Director of the

He said the Commonwealth Secretariat had always looked on women and development issues as priority areas and the concerns for

monwealth did as a follow-up to such programmes, Mr Swartland said it was not for the Commonwealth to impose but was meant to stimulate action.

MIDWEEK SUN WEDNESDAY AUGUST 22, 1990 PAGE 5

ROADSHOW FACES STRUCTURAL PROBLEMS

Vocational, technical studies given priority

By Mmuso Tidimane

The Minister for External Affairs, Dr Gaositwe Chiepe, says it is the government's priority to promote better performance in the technical and vocational fields of study

cipants that most women opt for administrative, teaching and secretarial courses which is quite unfortunate because there are lots of intelligent, capable women in this country who can do much better

er coun- as and made at she said did not eers in blamed society's

there could be a role model specialising in women's matters.

Workshops and seminars could be organised to help educate employers on the role of women in today's world of science and

need to do away with optional subject opportunities for both girls and boys (for example...technical drawing and woodwork which are meant for boys and home economics for girls).

they felt would serve to guide their future career choices and not what the children asked for.

The cultural attitude (serving as a defence) would also need to be changed and women would

Roadshow reaches F/Town

Owa Correspondent

The Commonwealth Secretariat's Educational Science and Technology Roadshow

the ation l by orted other ually a last

ld at thers ually

Mr Ebrahim said the roadshow was very appropriate in that it served the needs of the Third World which was still bound by the traditional customs which acted as a barrier to allowing girls and women to participate in the science and technical oriented fields.

He said that one of the problems faced by women in today's society included the reluctancy of government in

appeal to them (women).

He said he welcomed such steps (projects) offered by the Commonwealth Secretariat in encouraging women and girls to move into the world of science and technology.

"Here in Francistown, we have technologically advanced projects but we lack the skilled power to man and maintain them," he said, citing the newly built Nyangabwe Hospital as

BOTSWANA DAILY NEWS AUGUST 24, PRICE 80t PAGE 3

"Science and technology are high on Commonwealth's educational list"

By Mmuso Tidimane

Science and Technology are uppermost in the priority list of educational objectives within the Commonwealth, the African continent, the SADCC region and Botswana.

This was said by the Mayor of Francistown, Councillor Iqbal Ebrahim, when he officially opened the Commonwealth Secretariat Technology Roadshow Seminar held at the Francistown Teacher Training College (TTC) last week.

Mr Ebrahim said there

acute shortag with qualifica disciplines.

Mr Ebrahi government ognised this, ol secondary ers who h science and has been a power probl

He said a and suitab secondary s are the best the science a tics based p technical st tive of their

FRIDAY AUGUST 24 1990 THE GUARDIAN

ROADSHOW REMARKABLE

By Ernest Molol

Science and Technology Roadshow closing ceremony in Francistown was a remarkable event.

Attended by many people from Francistown, who braved the chilly winter nights, the event opened with a panel discussion. Professor Deborah Avakaiye, Dean, Faculty of Science at the University of Jos, Nigeria, argued that the technological revolution will only come about if women too are educated

technical related subjects are concerned."

She argued that religion also contributes to the practice of binding women to the kitchen.

One point she mentioned that had her audience eating out of her hands was when she attacked marriage.

"Women or wives are kept as house-keepers and cooks...but one wonders why in some of the best hotels of the world men are cooks or chefs!

ed.

In her contribution Dr Habandi Hobona, Head of the Surgical Department at Nyangabwe Hospital, in an attempt to answer the question of discrimination, said: "It is not men who are to blame for women failing to make it in the science world."

She said women also tend to stand in the corner when the need to fight for their rights arises. She cited as a practical example, Elizabeth Gareth Anderson and Florence

had been conditioned to believe that they were not able to do what their brothers could.

She said it was pathetic that much talent and potential in women should be wasted in administrative, teaching and secretarial courses when these women could go for science and technical courses.

She added that she hoped girls would lead in the fore-front of the changing world by exploiting opportunities that the government would offer in its next

Fig.13. Extracts from press reports

12. DOCUMENTATION

12.1 The official report

If an official report is required at the end of an event, it is essential to prepare for it well ahead and to ensure all events of the Roadshow are recorded. One of our organisers was given the responsibility to ensure all sessions were recorded. The recording was done by teachers, both foreign and local, who were given a short briefing at the start of the Roadshow of what was expected of them.

A Programme Manual was produced for organisers and recorders before the Roadshow. The manual showed, in addition to the programme, who was responsible for what and at what time. A sample page from this manual is shown in figure 14. This manual also had a column for the recorders.

PROGRAMME MANUAL FOR ORGANISERS

Date & Time	Programme activity	Coordinator(s)	Recorders
Tuesday 14/8/90 0700h	Breakfast		
0800-1000h	Activity 2 & 3/paired	Act.2: Coordinated by: P.Jartby Act.3: Coordinated by: R.Saluja Assisted by: J.Mothobi, G.Wijffels,G.Sento, J.Dichabeng	Act.2: Ramahosi V.Williams Act.3: M.Moiloa Mooketsi
1000h	Tea		
1030-1230h	Activity 2 & 3/paired	as above Re-assembly and return of equipment for act.3: G.Sento, J.Dichabeng	
1230h	Lunch		
13.30h	Departure for workplaces	Transport: S.Ramaswami	

Fig.14. Extract from Organisers' Programme Manual

For each venue we had two typists and two computers. These were used to produce group lists, print instructions for various events, type speeches, and to enter the recorded sessions into a wordprocessor.

12.2 The Roadshow Magazine

For each venue approximately 6 students were invited specifically as 'Roadshow reporters'. The pre-qualification was that they should have been involved in a school magazine. A member of the organising committee (who had tried this out before) volunteered as chief editor and coordinator for this activity. The activity required, for each venue, 2 computers, a printer, secretarial assistance, photographic equipment, and a powerful photocopier or other printing facilities.

On the evening of the first day the Magazine team had its first meeting, whilst the main group had its 'ice-breaking bridge building activity'. The purpose of the Magazine was explained, and together a list with topics for the first issue was brainstormed. Then the topics were allocated to pairs of journalists. The necessity of a definite deadline for finishing articles was

explained, and it was decided to have every article ready the following day at two o'clock.

It was also made clear that the complete production of the Magazine: writing, editing, layout, illustrating, printing/photocopying and distributing was going to be done by the students themselves, thus giving them a glimpse of another highly technological profession.

The next day the journalists went out to do their duties, and gradually trickled back to base to hand in their material. This was then typed in a word processor and provisionally printed.

Typing the Roadshow Magazine

Putting on the final touches to the Roadshow Magazine

60
BEST COPY AVAILABLE

At four o'clock the first layout started, whilst others were still writing, making cartoons, typing etc. Eventually a master copy of the Magazine was ready, and photocopied on A3 paper. The paper was just ready in time to be distributed before the last evening activity closed.

The next morning the whole process started afresh, and in the evening an even thicker, more professional paper was produced. The decision to produce two magazines rather than only one proved to work out very well: the magazine quickly secured its place in the Roadshow. The first magazine taught the students how to do it and the second one was their 'masterpiece'.

The magazine team was supported by a former science teacher with school magazine experience, whilst another teacher did most of the typing. A fast and versatile typist proved to be essential to have the Magazine produced in the set time limits, because while some students can type, hardly any have the speed required to produce enough typed text in the given time.

Access to printing facilities is also essential, especially during the evenings, because that proved to be the time the paper was printed. We worked with a photocopier in Gaborone, and with an offset press in Francistown, but a stencil cutter and a 'Gestetner' would also have done the job. Typing text on stencils straight away is not advisable, because it is very difficult then to do proper layout and appropriate drawings.

13. EVALUATION

An evaluation questionnaire was given to the students and the teachers just before departure. Participants were asked to rate the various Roadshow activities on a scale from 1 to 5, 1 representing 'boring' and 5 representing 'interesting'.

The Roadshows in both Gaborone and Francistown were perceived as a great success by the participants. All practical activities, all career guidance activities and the panel discussion were given average ratings between 4 and 5. A slightly lower rating was given to the opening and closing ceremonies (excluding the panel discussion). The students in their comments noted that the speeches were 'too long' and 'too many'. They also suggested that in future we also allow students to make speeches. In general the students enjoyed most of the activities in which they themselves were able to take part.

Highly appreciated events were the career guidance clinic and the visit to role models. Many participants indicated that they gained knowledge of various careers and that they got encouragement to take up a career in science/technology. Most participants became convinced of the slogan of the Roadshow, i.e. that 'women make it in science and technology'. They preferred to express it as 'women <u>can</u> make it in science and technology' - when given the chance/ when you try hard/ when you are determined. They were convinced that men and women are equal.

The most popular activity was the computer session. Computing is probably seen as a symbol of progress, the future, of new opportunities.

Many students stated that the activity from which they learned most was the computer exposure.

The biggest problem experienced during the Roadshow was the tight schedule. Once the Roadshow started, there was no breathing space before the final closing in Francistown. This caused problems for the organisers. As long as everything was running as planned there was no problem. However, if one of the organisers was unable to carry out his/her duty, or if an unexpected problem cropped up, there was no time to bring the organisers together for a review as we were now already getting ready for the next activity. We finished the Gaborone Roadshow on Wednesday morning, packed equipment and got into vehicles to drive 440 km, to start the Francistown Roadshow that same evening. For future organisers we strongly recommend that there is a short break, maybe a week-end, between running such roadshows. The problem there is of course the expense of keeping the foreign resource people and participants for a few extra days.

Associated to this time problem was the involvement of resource people and teachers. We had originally thought that we would bring in at least some of the teachers earlier so we could brief them on their role in the Roadshow. However, this didn't work out as the same teachers also had to escort the students from the various parts of the country. Therefore, the teachers arrived with the students and that is the time we moved straight into the activities. All teachers were assigned duties as reporters, and also guided the students during the career guidance clinic. However, had there been time for the teachers and organisers to sit together and discuss the programme, we could have utilised the teachers more fully.

From the response to the questionnaires it appeared that the teachers also thoroughly enjoyed the experience. However, feelings were expressed that they would have liked to be full participants. The Roadshow was designed for students. Teachers were primarily invited to observe so that later they could carry out similar activities at school or regional level. In some of our activities we provided enough equipment for the teachers to participate (e,g, the bridge/tower building), but not others. In the case of the computer, the bicycle/marimba and the polytechnic activities, equipment was the limiting factor. We were able to arrange facilities for 60 participants. If we had included the teachers as full participants, we would have had to reduce the number of student participants. This is a consideration other countries would have to look into.

The foreign resource people and role models were used in various ways (keynote speakers, panelists, role models for the career clinic, sharing experiences with the teachers etc.). To get the full benefit of the resource people, it would be necessary for them to arrive a few days earlier in order to obtain their input and ideas before the programme was finalised. In our case, the resource people who arrived a day before got some briefing on what to expect, while those arriving after the start were thrown in unbriefed; this again could have been corrected more quickly had the programme been less tight.

On the question on timing, the majority of students suggested that the Roadshow should be longer to allow more time for each activity and also more activities. In particular, they would have wished to have more time for the career guidance clinic. With so many careers represented, it was

not possible for a student to visit all rooms or to have enough time in each room, neither was it the intention. The students also found the programme tight and would have liked some time off for sports and relaxation.

The students emphasised the need to invite and involve parents in activities of this kind. Our efforts to invite parents, which was done through personal letters to the students as well as through posters put up in public places, were of limited success. A better approach may be to contact the Parent-Teacher Associations in the relevant schools.

Because only a limited number of students were invited to the Roadshow, the need for follow-up activities to reach others was stressed.

Acknowledgements

The success of this Roadshow was a result of tremendous financial and professional support both from local and international organisations, and from individuals both from Botswana and a number of other African countries.

INPUT FROM ORGANISATIONS

Financial support was given by four major sponsors, namely *the Commonwealth Secretariat, UNESCO, SIDA, and the Botswana Government*, but a number of other organisations also assisted by providing financial assistance for prizes, publicity, materials, refreshments, educational trips etc. They were *De Beers Botswana Mining Company, Sefalana sa Botswana, Heinemann Educational Boleswa, Shell Oil Botswana, Macmillan Botswana Publishing Co., Longman Botswana Educational Publishers, The American Embassy,The British High Commission.*

Some organisations provided **professional support**, e.g. by supplying role models, providing resource people, providing exhibitions, providing career information, being open for study visits, assisting with printing , equipment etc. They were *Air Botswana, Apal Computers , Autohaus, Auto Trades Training School, Botswana Agricultural College, Botswana Telecommunication Corporation, Botswana Housing Corporation, Bridec, The British Council, Central Transport Organisation, Data Processing (Pty)Ltd., De Beers Botswana Mining Company, Department of Supply, Department of Wildlife, Extas Electronic and Computer Technology (Pty)Ltd., Geological and Geodetic Services, Government Computer Bureau, Government Printer, ICL Botswana (Pty)Ltd., Department of Meteorological Services, Marothodi (Pty)Ltd., Ministry of Agriculture, Ministry of Health, Ministry of Works and Communication, National Health Institute, Nyangabgwe Hospital, Princess Marina Hospital, Water Utilities Corporation*

Access to facilities as well as professional support was provided by *University of Botswana, Francistown Teacher Training College, Teaching Aid Production Unit, Botswana Polytechnic, Francistown Secondary School, Mater Spei College, Setlalekgosi Junior Secondary School, Francistown Town Council.*

INPUT FROM INDIVIDUALS

Below are lists of all the people who contributed in various ways.

We like to thank in particular *the Minister of Education, The Hon. M.R. Molomo, and the Minister of External Affairs, The Hon.Dr. G.K.T. Chiepe*, who through their presence helped to emphasise the importance of this event and its aim; the *Permanent Secretary, Ministry of Education, Mr.P.Molosi* , who assisted with international communication and provided his full support to this event; the *Deputy Permanent Secretary, Ministry of Education, Mr.P.V.Sephuma*, who assisted in solving a number of pre-roadshow problems as well as in the running of the event.

External resource people and role models

Foreign resource people contributed as key-note speakers, panelists, role models etc as specified in the enclosed programme (see Appendix 1):

Mr.J.R. Swartland, Assistant Director, Education Programme, Commonwealth Secretariat, London, UK
Mr.E.Apea, Chief, Science and Technology Education Section, Division for the Development of Education, UNESCO, Paris, France
Dr.C.Puta, Head of Laboratories, Tropical Disease Research Centre, Ndola, Zambia
Prof. E.Ajakaiye, Dean of Science, University of Jos, Jos, Nigeria
Ms.M. Wagaiyu, Senior Lecturer, Kenya Polytechnic, Nairobi, Kenya
Ms.V.Williams, Mechanical Engineer, Ghana Water and Sewerage Corporation, Accra, Ghana
Mr.E.Karuhiji, Ag.Chief Education Officer, Ministry of Education, Kampala, Uganda

Local resource people

Local resource people contributed as speakers for the opening and closing ceremonies, chairpersons, panelists etc. as specified in the enclosed programme (see Appendix 1):

Mr.I.Ebrahim, His Worship the Mayor of Francistown
Mr.M.Modisi, Director, Department of Public Service Management
Mr.F.M.Mawela, Chief Education Officer (Secondary), Ministry of Education
Prof.T.Tlou, Vice-Chancellor, University of Botswana
Dr.T.T.Mokoena, Dean of Science, University of Botswana
Dr.M.Kahn, Acting Dean of Education, University of Botswana
Dr.L.Mahloane, Superintendent, Princess Marina Hospital, Gaborone
Mr.M.J.Mbaakanye, Director, Botswana Confederation of Commerce Industry and Manpower
Dr.H.N.C.Hobona, Superintendent, Nyangabgwe Hospital, Francistown
Mr.P.Moatlhodi, Member of Francistown Town Council, Francistown
Mr.S.T.Motswaledi, Regional Education Officer, Ministry of Education
Mrs.S.Seisa, Secretary, Botswana National Commission for UNESCO
Mr.W.P.Ramokate, Ag.Principal, Francistown Teacher Training College

The following resource people helped in the running of the Career Guidance Clinics and the practical activities etc.(in alphabetical order):

Mr.I.Abdulla, Extas Electronic and Computer Technology (Pty)Ltd.
Ms.F Bakwena, Bursaries Secretary, Ministry of Education
Mr.DB Bhusumane, CD&E, Ministry of Education
Mr.D Bythell, Education Officer(Design and Technology), Selibe-Phikwe Inservice, Ministry of Education
Mr.J Chengeta, Curriculum Development Officer, CD&E, Ministry of Education
Mr.Kevin Dale, Design and Technology Teacher, Francistown Secondary School
Mr.H.Delwar, Design & Technology Teacher, Setlalekgosi CJSS, Francistown
Ms.J. Dichabeng, Student, University of Botswana
Mr.K.Dutton, Design & Technology Teacher, Shashe River School, Tonota
Mr.O.Galatlhwe, Acting Training and Development Manager, Orapa Mine
Mr.C.T. Ganesan, Senior Lecturer, Dept.of Civil Engineering, Botswana Polytechnic
Mr.S.K.Gupta, Botswana Telecommunication Corporation, Gaborone

Dr.P. Kajibwami, Veterinary Department, Francistown
Mr.T Kealeboga, Lecturer, Dept.of Electrical Engineering, Botswana Polytechnic
Mr.M.Kewagamang, Lecturer, Dept.of Teacher Education, Botswana Polytechnic
Mr.T.King, Education Officer(English), Francistown Inservice, Ministry of Education
Mr.N Kisenga, Senior Lecturer, Dept.of Teacher Education, Botswana Polytechnic
Mr.Jacob Kuzani, Association of Training and Development Officers (ATDO)
Mr.Samuel Mabelebele, Teaching Aid Production Unit (TAPU)
Ms.G.Malete, Design & Technology Teacher, Kwenasereto CJSS, Moleopolole
Mr.U.Mangole, Mine foreman, Orapa Mine
Mr.M.Masire, Section engineer, Orapa Mine
Ms.Matshediso Masire, ICL Botswana (Pty)Ltd.
Ms.N.Mhlanga, Bursaries Unit, Ministry of Education
Mr.A.Moatshe, Lecturer, Botswana Agricultural College
Ms.W Moipolai, Design and Technology Teacher, Ramotswa CJSS, Ramotswa
Mr.K Mosetlhanyane, Lecturer, Botswana Agricultural College
Mr.J Mothobi, Lecturer,Dept.of Mechanical Engineering, Botswana Polytechnic
Mr.J.Motsomi, Dataprocessing (Pty)Ltd & Apal Computers (Pty)Ltd.
Mr.M.Ngazimbi, Extas Electronic and Computer Technology (Pty)Ltd.
Mr.E.Nkomo, Botswana Telecommunication Corporation, Francistown
Ms.J Obetlile, Design and Technology Teacher, Maikano Junior Secondary School, Gaborone
Mr.S.Rawal, Dataprocessing (Pty)Ltd & Apal Computers (Pty)Ltd.
Mr.R Saluja, Lecturer, Dept.of Mechanical Engineering, Botswana Polytechnic
Mr.G. Sento, Student, University of Botswana
Ms.Maria van Overeem, BRIDEC
Mr.J Walter, Education Officer(Design & Technology), Lobatse Inservice, Ministry of Education

Local role models

The women scientists and technologists listed below acted as role models in various ways; as actors for the role model video, by writing about themselves, by posing for photographs, by providing career guidance to students, by inviting students to their work places, etc.(in alphabetical order):

Ms.Ama, Pharmacist, Nyangabgwe Hospital, Francistown
Mrs.A.N.C.Bareki, Radiographer, Princess Marina Hospital
Dr.G.Binta-Mushi, Veterinary Surgeon, Ministry of Agriculture
Mrs.Mmoloki Charongwa, Radiographer, Princess Marina Hospital
Dr.L.Chimidza, Medical Doctor/Pediatrician, Princess Marina Hospital
Mrs.A.Coogan, Optician, Optico Centre, Francistown
Dr.T.Diteko, Veterinary Surgeon, Veterinary Services, Ministry of Agriculture
Ms.Sarah Gaolekwe, Laboratory Technologist, Princess Marina Hospital
Dr.T.Hobona, Dentist, Oral Health Division
Dr.H.N.C.Hobona, Surgeon, Nyangabgwe Hospital, Francistown
Ms.Tsiamo Keraang, Telecommunication Technician, Botswana Telecommunication Corporation
Mrs.J. Macala, Animal Nutritionist, Ministry of Agriculture

Ms.K. Magama, Laboratory Technical Officer, Ministry of Agriculture
Ms.Thelma Makgoeng, Architect, Botswana Housing Corporation
Ms.G. Malete, Design and Technology Teacher, Kwenasereto CJSS, Molepolole
Ms.A. Maphanyane, Physiotherapist, Princess Marina Hospital
Mrs.Masisi, Pharmacist, Sunnyside Pharmacy, Francistown
Ms.Rapelang Masogo, Wildlife biologist, Department of Wildlife
Ms.Lydia Moagi, Scientific Officer, Ministry of Agriculture
Ms.Neo Modisi, Architect, Botswana Housing Corporation
Dr. Matshidiso Moeti, Medical Doctor/Public Health, Ministry of Health
Ms.W Moipolai, Design and Technology Teacher, Ramotswa CJSS, Ramotswa
Ms.Goaba Morake, Microbiologist, formerly with Ministry of Health, Gaborone
Ms.Lillian Mosimaneotsile, Civil Engineer, Water Utilities, Lobatse
Maungo Motlhabane, Auto electrician, Autohaus, Gaborone
Thatafatso Motlogelwa, Welding Instructor, Central Transport Organisation
Mrs.Myengwa, Accountant, Francistown Town Council
Mrs.Sakhile Nyoni, Pilot, Air Botswana
Ms.J.Obetlile, Design and Technology Teacher, Maikano Junior Secondary School
Ms.Ambi Phutego, Geologist, Geological and Geodetic Services
Ms.Sentsetsa Pilane, Chemistry lecturer, University of Botswana
Ms.Gladys Ramothwa, Meteorologist, Department of Meteorological Services
Ms.Sinah Selelo, Pharmacist, Princess Marina Hospital
Dr. Setswaelo, Animal Breeder, Chief Animal Production Range Research Officer, Ministry of Agriculture
Mrs.M.Sharrock, Architect, Nattell Smith Architects, Francistown
Ms.Cassandra Stoneham, Aircraft Maintenance Technician, Air Botswana
Mrs.D.S.Tau, Lecturer, Molepolole College of Education, Molpolole
Ms.K.Tautona, Dietician, Nyangabgwe Hospital, Francistown
Mrs.Patricia Walker, Social forester, Forestry Association of Botswana
Charity Zwikula, Auto mechanic, Central Transport Organisation

Organisers

The people who made the whole thing happen were, in the first place, *Mr.J.Swartland from the Commonwealth Secretariat and Mr.E.Apea from UNESCO*, but the success of the roadshow is a result of involving a large number of local resource people in the planning, preparation and running of the roadshow. It would take up too much space to specify in detail how each and everyone contributed. We think it suffice to say that the Roadshow was a result of good teamwork, which would not have happen without the committed people listed below.

The small coordinating team consisted of:

Mrs.Marianne Nganunu, Senior Education Officer(Science), Ministry of Education (overall coordinator)
Mrs.Segakwang Seisa , Secretary, Botswana National Commission for UNESCO
Mrs.Topoyame Mogotsi, Education Officer(Mathematics) , Ministry of Education & Chairperson for the Mathematical Association of Botswana

Members of the Committees were (in alphabetical order):

Ms.Patty Adair, Shashe Brigades
Mr.Brian Ardern, Education Officer (Science), Francistown Inservice, Ministry of Education
Ms.Isabel Bale, Lecturer, Francistown Teacher Training College
Mrs.Pammy Bhatia, Lecturer, DMSE, University of Botswana
Ms.Elizabeth Busang, Career Guidance Officer, Bursaries Dept., Ministry of Education
Mr.Simon Chandy, Mathematics Teacher & representative Mathematics Association Botswana, Gaborone Secondary School
Mr.Lance Corker, Education Officer (Mathematics), Francistown Inservice, Ministry of Education (Francistown coordinator)
Mr.Charles Duffield, Education Officer (Design & Technology), Mochudi Inservice, Ministry of Education
Mr.Nyaladzo Fanakiso, Ag.Deputy Principal, Francistown Teacher Training College
Mr.Henk Frencken, Coordinator, UB-INSET, University of Botswana
Mr.Jos Goosen, Education Officer(Science), Mochudi Inservice, Ministry of Education
Mr.Per Järtby, Lecturer, PESC, University of Botswana
Mr.K.M.Joseph, Lecturer, Tonota College of Education
Dr.Ulla Kann, Senior Research Fellow, NIR, University of Botswana
Mrs.Tandy Kobedi, Jwaneng Mine, De Beers Botswana Mining Company
Mrs.Irene Kwape, Headmistress, Moeding College (sub-committee chairperson)
Mr.Mark Langenbacher, Teaching Aid Production Unit, Ministry of Education
Ms.Precious Leinaeng. Francistown Teacher Training College
Ms.Sipho Madisakwana, Mathematics teacher, St.Joseph's College
Mrs.Susan Makgothi, Senior Curriculum Development Officer (Science), Ministry of Education
Ms.Ntombizodwa Manewe, Design & Technology teacher, Setlalekgosi CJSS, Francistown
Mrs.Joyce Maphorisa, Senior Guidance Officer, CD&E, Ministry of Education
Mr.Cornelius Matlhare, Senior Education Officer (Agriculture), Ministry of Education
Dr. Mazonde, Medical Officer, Princess Marina Hospital
Mr.Elijah Mhotsha, Teaching Aid Production Unit, Ministry of Education
Mr.Bushy Mmatli, Science Student, University of Botswana
Mr.Lucky Moahi, Senior Education Officer(Science) & Chairman, Botswana Science Association, Ministry of Education (sub-committee chairperson)
Ms.Vilhelmina Moatlhodi, De Beers Botswana Mining Company
Ms.Goaba Morake, Botswana Telecommunication Corporation
Ms.Lillian Mosimaneotsile, Area engineer, Water Utilities Corporation, Lobatse
Mr.Haniso Motlhabane, Senior Education Officer (Agriculture), Ministry of Education
Mr.Onthusitse Motsomi, Science Equipment Coordinator, Ministry of Education
Mr.Moipolai Motswiri, Education Officer (Science), Lobatse Inservice, Ministry of Education
Dr.Marjorie Muehlke, Senior Lecturer, Head of Science, Tonota College of Education (Francistown coordinator)
Ms.Charity Nkala, Information Officer, Department of Information and Broadcasting

Mr.John Nkane, Boarding Master, Francistown Teacher Training College
Ms.Margaret Ntongana, Agriculture Teacher, Setlalekgosi Secondary School
Mrs.Manini Nyati, Guidance Officer, CD&E, Ministry of Education
Mr.Moatlhodi Oabile, Senior Education Officer (Science), Ministry of Education
Mr.Michael Oosterhout, Lecturer, PESC, University of Botswana
Mr.Bosele Radipotsane, Senior Education Officer (Mathematics), Ministry of Education
Mr.Subramanian Ramaswami, Senior Education Officer (Mathematics), Ministry of Education
Ms.Paivi Rayamaki, SIDA, Swedish Embassy
Mr.Leboro Selerio, Senior Education Officer (Mathematics), Ministry of Education
Mr.Robert Sulley, Editor, Heinemann Educational Botswana
Mr.Steve Taylor, Education Officer (Design & Technology), Francistown Inservice, Ministry of Education
Mrs.Prisca Thapisa, Lecturer Tlokweng Teacher Training College
Mr.John Thomas, Senior lecturer, Head of Diploma Studies and Science, Botswana Polytechnic (sub-committee chairperson)
Mrs.Godelieve Wijffels, Lecturer, PESC, University of Botswana
Ms. Marlies Zonneveld, Lecturer, DMSE, University of Botswana (sub-committee chairperson)

Filming and photography
Mr Andrew Quarmby, Educational Videofilms
Dr Mike Kahn, University of Botswana
Mr Jan Koeman, Bokamoso Junior Secondary School
Mr Christoffer Busang, Ministry of Education

Secretarial assistance
Ms.Stella Ngwako, Secretary, University of Botswana
Ms.Gaotlhobogwe Malepa, Secretary, University of Botswana
Ms.Susan Babikanyisa, Student, University of Botswana
Mr.Aubrey Muswema, Student, University of Botswana

News coverage
Charity Nkala, Department of Information and Broadcasting
Mmuso Tidimane, Department of Information and Broadcasting
Rutang Moses, Department of Information and Broadcasting
Ernest Moloi, Botswana Guardian

People behind the scene
In addition to all the people mentioned above, there were others who contributed in the background. These include the Finance Officer, the Chief Supplies Officer, the Planning Unit staff, the Chief Education Officer (Teacher Education), all in the Ministry of Education; the Deputy Permanent Secretary, Ministry of Works and Communication; the staff responsible for food and accommodation at the University of Botswana and the Francistown Teacher Training College; and the Government Printer, who ensured all resource materials were printed in time for the roadshow.

APPENDIX 1

Programme of activities

Day 1		**Explanation of code**
14 00- 18 00h	Arrival of participants, registration	
1730-1830h	Supper	
1900-2130h	Briefing by organisers, introductions, activity no. 0 and	Activity 0= Bridge building in Gaborone, Tower in Francistown and .....cool drinks and snacks
Day 2		
0800-0900h	Official opening(see special programme)	
0900-0930h	Tea	
0930h	Transfer to the Polytechnic	
1000-1230h	Activity no 1.	Activity no.1= Pendant making in Gaborone, Ball bearing game, Steady hand game and Pendant making in Francistown
1230h	Transfer back to the University	
1230-1330h	Lunch	
1400-1730h	Career Guidance Clinic/ Open to the Public	
1800h	Supper..... and time for news?	First edition of Roadshow Newsletter
2000-2130h	Student Quiz	Solving puzzles
Day 3		
0800-1000h	Student activity 2 & 3/paired	Activity 2= Computer exposure
1000h	Tea	Activity 3= Bicycle assembly in Gaborone, Marimba assembly in Francistown
1030-1230h	Student activity 2 & 3/paired	
1030-1230h	Meeting of teachers and resource people (228/3)	

APPENDIX 1

1230-1330h	Lunch
13 30h	Departure for workplaces
1400-1630h	Visits to rolemodels at work
1730-1830h	Supper
1930-2130h	Open night: panel discussion and closing cermony (see special programme)
Day 4	
0700-0800h	Breakfast
0800-0900h	Administrative arrangements, evaluation, etc.
0900- 1000h	Check out and departure

APPENDIX 1

Official Opening, Gaborone

Monday 13 August at 08 00 h in the University Auditorium

Chair: Deputy Permanent Secretary, Ministry of Education *(Mr.P.V.Sephuma)*

1. Welcome and Introductions by chairperson

2. Message from the Commonwealth Secretariat by Assistant Director of Education Division Programme*(Mr.J.Swartland)*

3. Opening Address by the Minister of Education*(The Hon. Mr.M.R.Molomo)*

4. Message from UNESCO presented by the Secretary for the National Commission for UNESCO *(Mrs.S.Seisa)*

5. Vote of Thanks by Chief Education Officer for Secondary*(Mr.F.Mawela)*

Programme for

OPEN NIGHT

14 August 1990 at 19 30 h in the University Auditorium, Gaborone

Chair: Dean of Science, University of Botswana *Dr.T.T.Mokoena*

Theme: **"The role of Women in Science and Technology"**

1. Welcome by the Vice-Chancellor, University of Botswana, *Prof.T.Tlou*

2. Keynote Address by *Dr.C.Puta*, Head of Laboratories, Tropical Disease Research Centre in Ndola, Zambia.

3. Panel Discussion; chaired by *Mr.J.Swartland* , Assistant Director of Education Division Programme, Commonwealth Secretariat.

   Panelists: *Prof.T.Tlou, Mr.M.J.Mbaakanye, Dr.L.Mahloane, Dr,C.Puta, Ms.V.Williams, Ms.M.Wagaiyu, Mr.E.Karuhije*

4. Acknowledgement of sponsors by roadshow official, *Mrs.T.Mogotsi*

5. Closing address by the Director for Public Service Management, *Mr.M.Modisi*

6. Vote of Thanks by *Prof.D.Ajakaiye*, Dean of Science, University of Jos, Nigeria

APPENDIX 1

Official Opening, Francistown

Thursday 16 August at 0830h at Francistown Teacher Training College

Chair: Chief Education Officer for Secondary, Ministry of Education *(Mr.F.Mawela)*

1. Welcome and Introductions by chairperson

2. Message from the Commonwealth Secretariat by the Assistant Director of Education Division Programme*(Mr.JSwartland)*

3. Opening Address by the Permanent Secretary, Ministry of Education, presented on his behalf by his Worship the Mayor of Francistown *(Mr.I.Ebrahim)*

4. Message from UNESCO presented by the Secretary for the National Commission for UNESCO *(Mrs.S.Seisa)*

5. Vote of Thanks by the Acting Principal of Francistown Teacher Training College *(Mr.Ramokate)*

Programme for

OPEN NIGHT

17 August 1990 at 19 30 h at the Civic Centre, Francistown

Chair: Deputy Permanent Secretary, Ministry of Education, *Mr.P.V. Sephuma*

Theme: **"The role of Women in Science and Technology"**

1. Welcome by His Worship the Mayor of Francistown *(Mr.I.Ebrahim)*

2. Keynote Address by *Mr.E.Apea*, Chief, Science Education Section, Division of Science Technical and Environmental Education, UNESCO

3. Panel Discussion; chaired by *Dr.M.Kahn*, Ag.Dean of Education, University of Botswana

   Panelists: *Mr. Motswaledi, Dr.HNC Hobona, Mr.P.Moatlhodi, Prof.D.Ayakaiye, Dr.C.Puta, Ms.V.Williams, Ms.M.Wagaiyu,*

4. Acknowledgement of sponsors by roadshow official, *Dr.M.Muehlke*

5. Closing address by the Minister of External Affairs, *The Hon. Dr.GKT Chiepe.*

6. Vote of Thanks by *Mr.E.Karuhije*, Ag.Chief Education Officer, Ministry of Education, Uganda

APPENDIX 2

Name	School	Home Address	Country
Foreign Student Participants			
Mpati Makoa	Mabathoana High School	Box 1438, Maseru 100	Lesotho
Thandiwe Chakela	Hlotse High School	P O Box 28, Leribe 300	Lesotho
Caroline Hans	St.Josephs R.C. High School, Döbra	P O Box 2115, Windhoek, Namibia 9000	Namibia
Ndahafa Hamupembe	Imanuel Shifidi High School	P O Box 57, Windhoek, Namibia 9000	Namibia
Lindiwe Matsebula	St.Francis	Lugogo Sun, P O Box 195, Ezulwini	Swaziland
Thula Gwebu	St.Michaels High School	Box 1459, Mbabane	Swaziland
Getrude Mmembe	Roma Girls Sec.School	Standard Chart.Bank, Box 32238, Lusaka	Zambia
Suzgo Kumwenda	Kabulonga Girls Sec.School	c/o Mr.BTR Kumwenda, Lusaka	Zambia
Ruth Forbes	Girls College, Bulawayo	Lima Bank, P O Box 32607, 34 Duncan Road, Suburbs, Bulawayo	Zimbabwe
Sandra Mudavanhu	Girls High School, Harare	ZIB 6th Avenue, Parktown, Harare	Zimbabwe
Foreign Teacher Participants			
Erika Kasee Ithana		Box 2239, Windhoek 9000	Namibia
Mary Grace Nkole	Kabulonga Girls Sec.School	P O Box 320098, Lusaka	Zambia
Matlohang Moiloa	Hlotse High School	P O BOx 39, Leribe 300	Lesotho
Sheila Cameron	Townsend High School	4 Connaught Avenue, Bulawayo	Zimbabwe
Victoria Kelly	University of Swaziland	UNISWA, P/B Kwaluseni	Swaziland
Student Participants in Gaborone			
Alka Bhatia	Gaborone Sec.School	P O Box 995, Gaborone	Botswana
Benedict Kgosilentswe	Matsha College	P O Box 67, Kanye	Botswana
Boitumelo Tau	Kagiso Sec.School	P O Box 24, Mogoditshane	Botswana
Bonang Nkoane	Molefi Sec.School	P O Box 123, Thamaga	Botswana
Charles Mokgobinyana	Moeding College	P O Box 26, Sedibeng	Botswana
Chris Kudi Mrema	Naledi Sec.School	P/Bag 0027, Gaborone	Botswana
Christopher Molefe	Molefi Sec.School	P O Box 1254, Mochudi	Botswana
Dikeme Lemponye	Molefi Sec.School	Olifants Drift, P O Box 2, Mochudi	Botswana
Ditshenyo Modisagae	Kagiso Sec.School	P O Box 100, Ramotswa	Botswana
Gape Kaboyakgosi	St.Joseph's College	P O Box 10004, Kanye	Botswana
Gideon Ditlhogo	Kgari Sechele Sec.School	P O Box 610, Molepolole	Botswana
Godfrey Sekobye	Molefi Sec.School	P O Box 453, Mochudi	Botswana
Grace Mhango	Maru-a-Pula School	P/Bag 0020, Gaborone	Botswana
Jayan Sunny	Molefi Sec.School	P/Bag 12, Mochudi	Botswana
Johane Malebogo	Seepapitso Sec.School	P O Box 161, Kanye	Botswana
Johannes Masila	Kagiso Sec.School	P/Bag 001, Ramotswa	Botswana
Katso Kgengwenyane	Moeding College	P/Bag 11, Otse	Botswana
Keitumetse Sekhute	Naledi Sec.School	P O Box 20784, Gaborone	Botswana
Keletso Mopipi	Matsha College	P O Box 312, Mogoditshane	Botswana
Kgopolo Molatlhegi	Lobatse Sec.School	P O Box 6, Selibe-Phikwe	Botswana
Khupo Kebadire	Naledi Sec.School	P O Box 1499, Gaborone	Botswana
Lapologang Onkabetse	Lobatse Sec.School	P O Box 390, Gaborone	Botswana
Lebogang Kemoeng	St.Joseph's College	c/o P O Box 185, Gaborone	Botswana

APPENDIX 2

Name	School	Home Address	Country
Leonard Mathemabe	St.Joseph's College	P O Box 20424, Gaborone	Botswana
Lorato Mosetlhi	Maru-a-Pula School	P O Box 40499, Gaborone	Botswana
Mercy Kono	Kgari Sechele Sec.School	P O Box 1224, Molepolole	Botswana
Mmanyai Moeng	Naledi Sec.School	P O Box 401710, Gaborone	Botswana
Molebatsi Leteane	Gaborone Sec.School	Private Bag 00125, Gaborone	Botswana
Mpho Serunga	Moshupa Sec.School	P O Box 275, Molepolole	Botswana
Nicki Grantham	Gaborone Sec.School	P O Box 1235, Gaborone	Botswana
Nonofo Keabaitse	Lobatse Sec.School	P O Box 382, Moshupa	Botswana
Ofentse Lempadi	Naledi Sec.School	P O Box 10112, Gaborone	Botswana
Pamela Mbongwe	Naledi Sec.School	P O Box 40033, Broadhurst, Gaborone	Botswana
Phemelo Masire	Seepapitso Sec.School	P O Box 481, Kanye	Botswana
Rachel Molewa	St.Joseph's College	P O Box 20534, Gaborone	Botswana
Sandra Kgwefane	Molefi Sec.School	P O Box 131, Ramotswa	Botswana
Selebo Mothagodi	Molefi Sec.School	P O Box 202, Mochudi	Botswana
Tebogo Moremi	Seepapitso Sec.School	P O Box 26, Kanye	Botswana
Tebogo Phiri	Maru-a-Pula School	P O Box 926, Gaborone	Botswana
Tebogo Seipone	Matsha College	P O Box 2, Kang	Botswana
Thandie Mosalakatane	Moeding College	P O Box 227, Kanye	Botswana
Tswelelo Chinyanga	Kgari Sechele Sec.School	P O Box 166, Molepolole	Botswana
Tumisang Mokgosi	Moshupa Sec.School	P O Box 44, Moshupa	Botswana
Unangoni Mukhopo	Lobatse Sec.School	P O Box 41, Kazungula, Kasane	Botswana
Yawa Duse-Antony	Moshupa Sec.School	P/Bag 001, Moshupa	Botswana
Student Reporters in Gaborone			
Bao Mosinyi	Molefi Sec.School	P O Kalamari, via Mahalapye	Botswana
Bosisi Ntshole	Gaborone Sec.School	P O Box 41292, Gaborone	Botswana
Dabilo Mokobi	Moeding College	P O Box 325, Gaborone	Botswana
Dick Mading	St.Joseph's College	P/Bag X02, Gaborone	Botswana
Dintle Rapoo	Molefi Sec.School	Artesia P. A., via Gaborone	Botswana
Ediretse Ramahobo	Gaborone Sec.School	P O Box 2151, Gaborone	Botswana
Teacher Participants in Gaborone			
Andrew Tselaesele	Molefi Sec.School	P/Bag 12, Mochudi	Botswana
Bangwato Sikwa	Lobatse Sec.School	P/Bag 0013, Lobatse	Botswana
Benjamin Moleko	Molefi Sec.School	P/Bag 12, Mochudi	Botswana
Brian Mooketse	Naledi Sec.School	P O Box 20527, Gaborone	Botswana
Caroline Makobo	Lobatse Sec.School	P/Bag 0013, Lobatse	Botswana
Clemence Antonio	Montshiwa Sec.School	P/Bag 005, Pitsane	Botswana
Ernest Mongwaketse	Kagiso Sec.School	P/Bag 001, Ramotswa	Botswana
Joseph Kaleekaparambil	Moeding College	P/Bag 11, Lobatse	Botswana
Kgosiemang Ramahosi	Ngwaketse Sec.School	P O Box 252, Kanye	Botswana
Peter d'Arcy	Matsha College	P/Bag 001, Kang	Botswana
Sebotso Richard	Naledi Sec.School	P O Box 20527, Gaborone	Botswana
Sheilah Barungwi	Seepapitso Sec.School	P/Bag 007, Kanye	Botswana
Student Participants in Francistown			
Agnes Matenje	Francistown Sec.School	P O Box 180, Matshelagabedi	Botswana
Baatlhodi Modise	Matshekge Hill Sec.School	Tsetsebye Village, P/Bag 005, Selibe-Phikwe	Botswana
Baboletse Akoonyatse	Matshekge Hill Sec.School	P O Box 464, Bobonong	Botswana

APPENDIX 2

Name	School	Home Address	Country
Bearington Matenge	Mater Spei College	P O Box 10455, Mambo Tatitown, Francistown	Botswana
Benjamin Lephodisa	Matshekge Hill Sec.School	P O Box 569, Bobonong	Botswana
Boipelo Mosarwe	Swaneng Hill Sec.School	P O Box 508, Serowe	Botswana
Bonani Silalame	Shashe River School	P O Box 5, Tutume	Botswana
Celia Mbish	Maun Sec.School	P O Box 9, Gantsi	Botswana
Cowen Stume	Tutume College	P O Box 5, Maitengwe	Botswana
Daniel Kgaimena	Swaneng Hill Sec.School	Serowe Cash Store, P O Box 608, Serowe	Botswana
Douglas Letsholathebe	Tutume College	Private Bag F/8, Tsamaya Village, via Francistown	Botswana
Dume Tshepiso	Selebi-Phikwe Sec.School	P/Bag 002, Selebi-Phikwe	Botswana
Emefa Tsekpo	Setlalekgosi Sec.School	P O Box 1105, Francistown	Botswana
Emmanuel Ngwako	Swaneng Hill Sec.School	P O Box 57, Serowe	Botswana
Enock Sepako	Moeng College	P O Box 93, Sefophe	Botswana
Eunice Chidoda	Francistown Sec.School	P O Box 168, Francistown	Botswana
Florence Molelekwa	Lotsane Sec.School	P O Box 19, Palapye	Botswana
Gape Morake	Mater Spei College	P O Box 963, Serowe	Botswana
Germinah Seshoka	Matshekge Hill Sec.School	Mathathane Postal Agency, P/Bag 0051, via Selibe-Phikwe	Botswana
Gideon Tjienda	Maun Sec.School	P/Bag 05, Maun	Botswana
Itani Mathumo	Tutume College	P O Box 39, Sebina	Botswana
Jackie Kirya	Mater Spei College	P O Box 1013, Francistown	Botswana
Jamila Kombe	Mater Spei College	Private Bag 127, Francistown	Botswana
Joas Khunong	Swaneng Hill Sec.School	P O Box 63, Serowe	Botswana
Kefetlhile Arabang	Moeng College	P O Box 50, Moeng	Botswana
Kesegofetse Ketshabile	Lotsane Sec.School	P O Box 31, Palapye	Botswana
Kgomotso Autlwetse	Swaneng Hill Sec.School	P O Box 533, Serowe	Botswana
Kudzanani Macala	Letlhakane Sec.School	Private Bag 001, Orapa	Botswana
Lame Gare Modise	Francistown Sec.School	P O Box 10184, Tatitown, Francistown	Botswana
Lydia Masilo	Moeng College	P O Box 290, Maunatlala	Botswana
Mary Moganana	Orapa Sec.School	P O Box 13, Orapa	Botswana
Minarul Delwar	Setlalekgosi Sec.School	c/o Mr.H.Delwar, P O Box 10008, Francistown	Botswana
Miriam Lefetogile	Madiba Sec.School	Radisele, P O Box 819, Mahalapye	Botswana
Montle Phuthego	Tutume College	Makaleng Village, P/Bag Makaleng	Botswana
Moses Kabelo	Lotsane Sec.School	P O Box 229, Shoshong	Botswana
Naledi Osentse	Moeng College	Mogapi Village, Box 83, via Sefhophe	Botswana
Oagaletse Ntekolang	Letlhakane Sec.School	P O Box 18, Letlhakane	Botswana
Omphaletse Mokwadi	Letlhakane Sec.School	Mopipi Village, P/Bag 003, Mopipi	Botswana
Polly Mosate	Letlhakane Sec.School	P O Box 29. Orapa	Botswana
Sebolokeng Tatebe	Letlhakane Sec.School	P/Bag 003, Mopipi, via Orapa	Botswana
Seleke Masilo	Matshekge Hill Sec.School	Private Bag Kobojango, via Palapye	Botswana
Simon Chimbombi	Selebi-Phikwe Sec.School	Private Bag 002, Selibe-Phikwe	Botswana
Sithulisiwe Mahoko	Shashe River School	Kalafong Chemist, P O Box 4, Tshesebe	Botswana
Tapiwa Kelennetse	Madiba Sec.School	P O Box 14, Gweta	Botswana
Tebogo Dingalo	Matshekge Hill Sec.School	P O Box 581, Bobonong	Botswana

APPENDIX 2

Name	School	Home Address	Country
Thata Mojiwa	Francistown Sec.School	Private Bag 14, Francistown	Botswana
Theo Seleke	Francistown Sec.School	Private Bag 14, Francistown	Botswana
Therisa Phillimon	Maun Sec.School	P O Box 24, Charleshill, via Gantsi	Botswana
Tiny Phutego	Selebi-Phikwe Sec.School	P/Bag 002, Selebi-Phikwe	Botswana
Tuelo Taziba	Lotsane Sec.School	P O Box 1130, Serowe	Botswana
Zambia Champi	Madiba Sec.School	Ramokgonani Postal Agency, P.O.Ramokgonani, via Palapye	Botswana
Student Reporters in Francistown			
Martin Mokgware	Lotsane Sec.School	P O Box 240, Mogoditshane	Botswana
Matilda Basinyi	Lotsane Sec.School	P O Box 57, Thamaga	Botswana
Ngqabutho Khumalo	Mater Spei College	P O Box 31, Francistown	Botswana
Olga Manyala	Swaneng Hill Sec.School	P O Box 118, Serowe	Botswana
Olivia Rabasoma	Shashe River School	P O Box 406, Mmadinare	Botswana
Othusitse Makgoro	Swaneng Hill Sec.School	P O Box 19, Goo-Tau, via Palapye	Botswana
Tiny Magama	Mater Spei College	P O Boxc 196, Orapa	Botswana
Teacher Participants in Francistown			
Catherine Sandy	Letlhakane Sec.School	P/Bag 004, Letlhakane	Botswana
Dudu Nemaorani	Francistown Sec.School	P/Bag 14, Francistown	Botswana
Fred Kawase	Lotsane Sec.School	P/Bag 50, Palapye	Botswana
Heinrich Muller	Maun Sec. School	P/Bag 05, Maun	Botswana
Jean-Pierre Chung-Yew	Maun Sec.School	P/Bag 05, Maun	Botswana
Lal Singh	Moeng College	P O Box 50, Moeng	Botswana
Malcolm Hunter	Swaneng Hill Sec.School	P/Bag 12, Serowe	Botswana
Tebagano Koodirile	Selebi-Phikwe Sec.School	P/Bag 002, Selebi-Phikwe	Botswana